Vol. 9, No. 9 SEPTEMBER, 1954

AGRICULTURAL CHEMICALS

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Connecticut Field Day

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CHANGES AHEAD---

Probably so — some we can see coming, others may surprise us. But changes mean that something is happening, which can be all to the good, if we are vigilant and resourceful.

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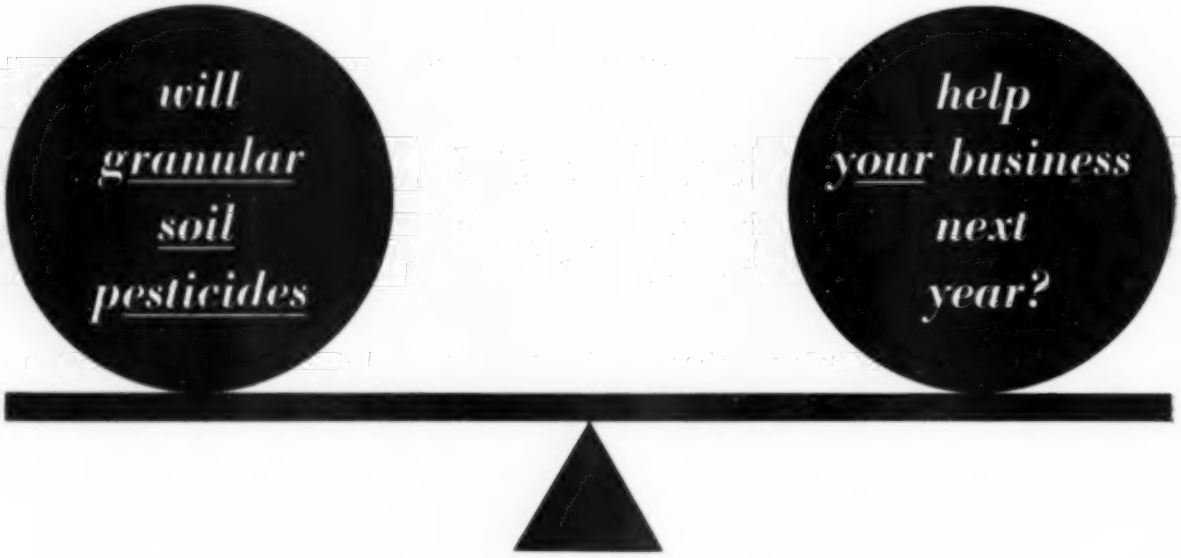

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AGRICULTURAL CHEMICALS

Lea S. Hitchner executive secretary NACA

This Month's Cover

Lea S. Hitchner, executive secretary of the National Agricultural Chemicals Association, which holds its annual fall meeting September 8-10, at the Essex & Sussex Hotel in Spring Lake, New Jersey.

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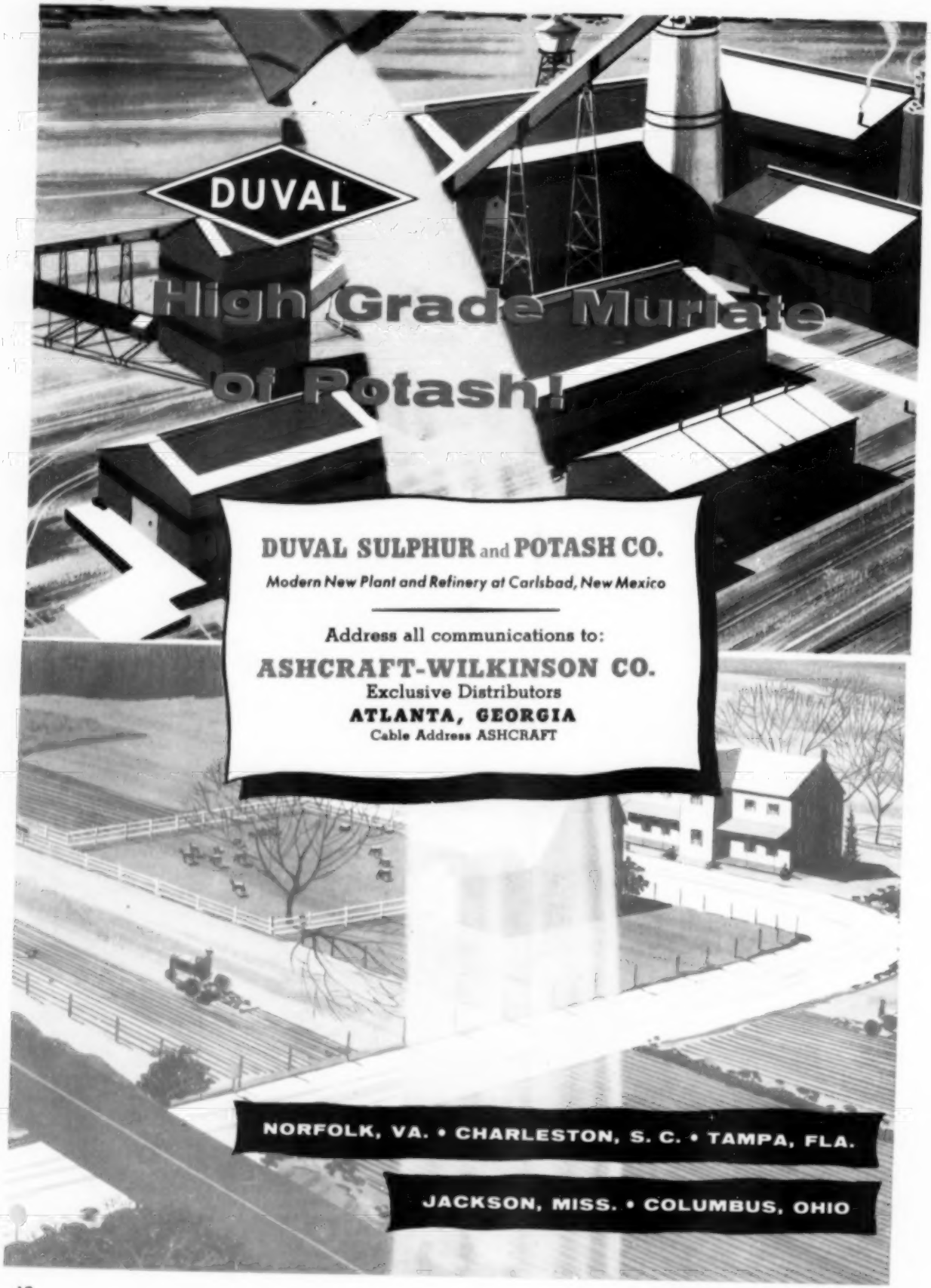
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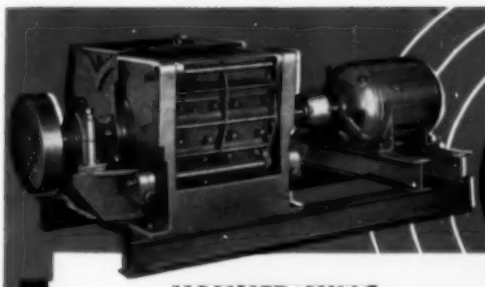

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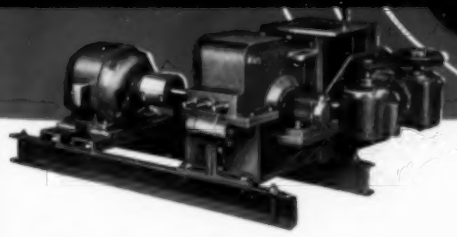

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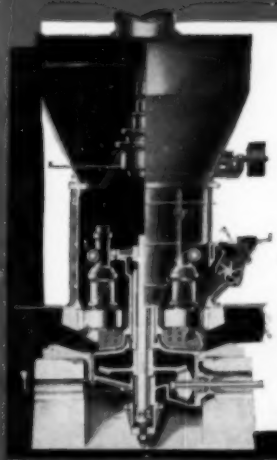

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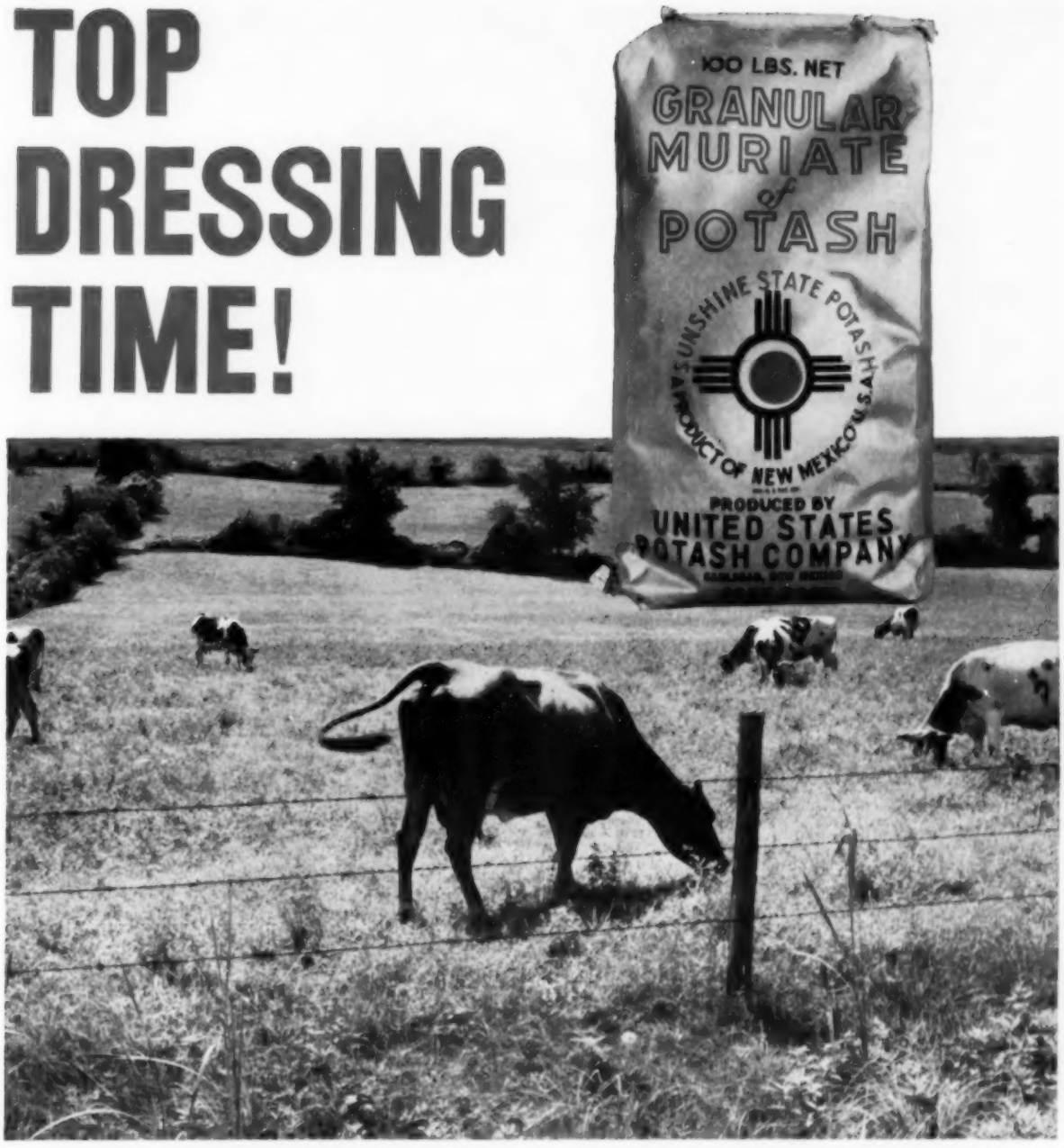

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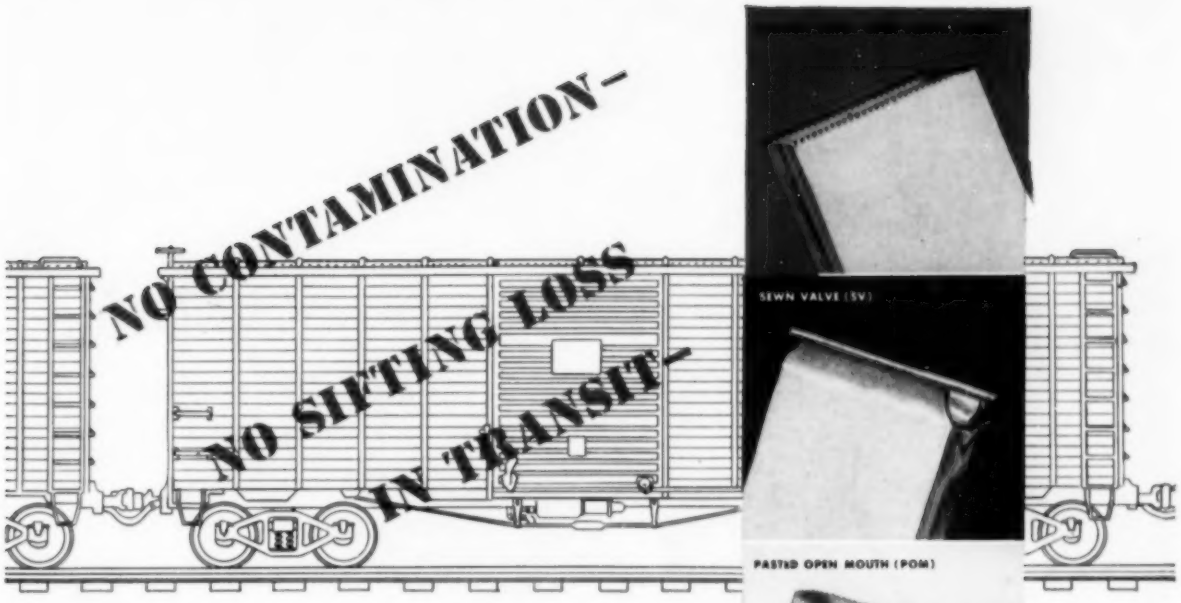

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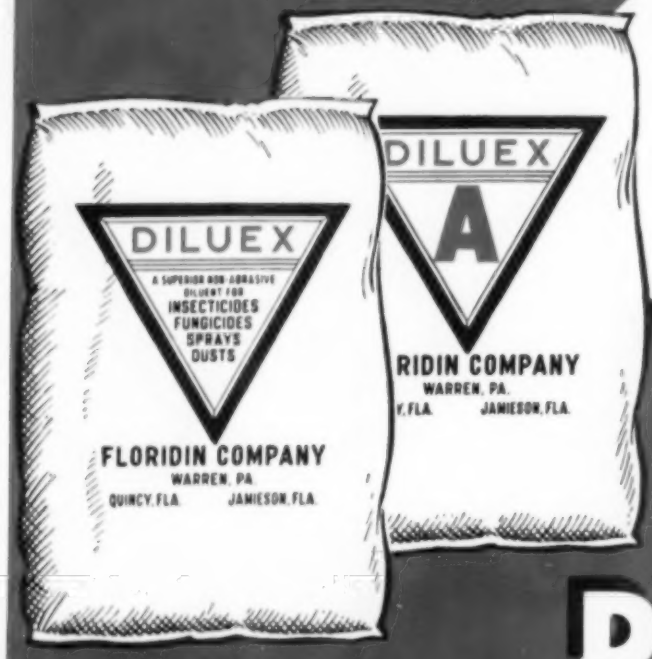

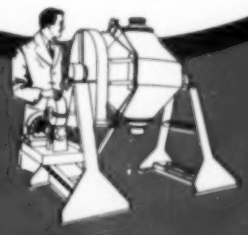

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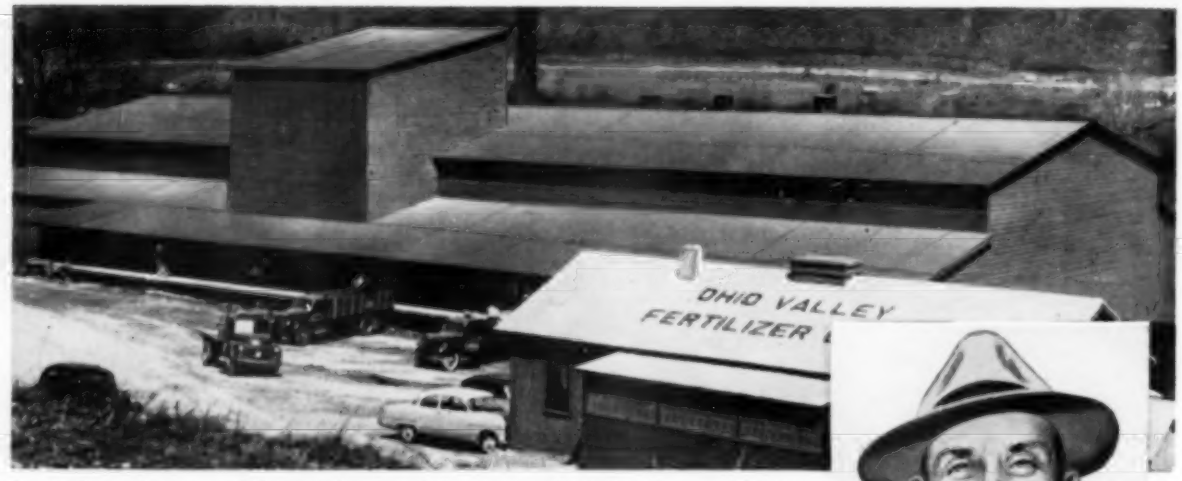

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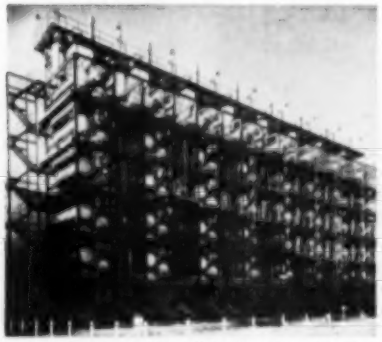

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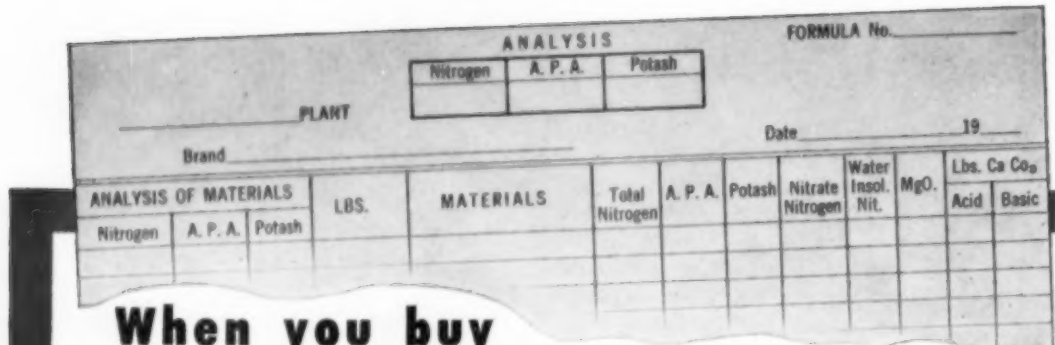

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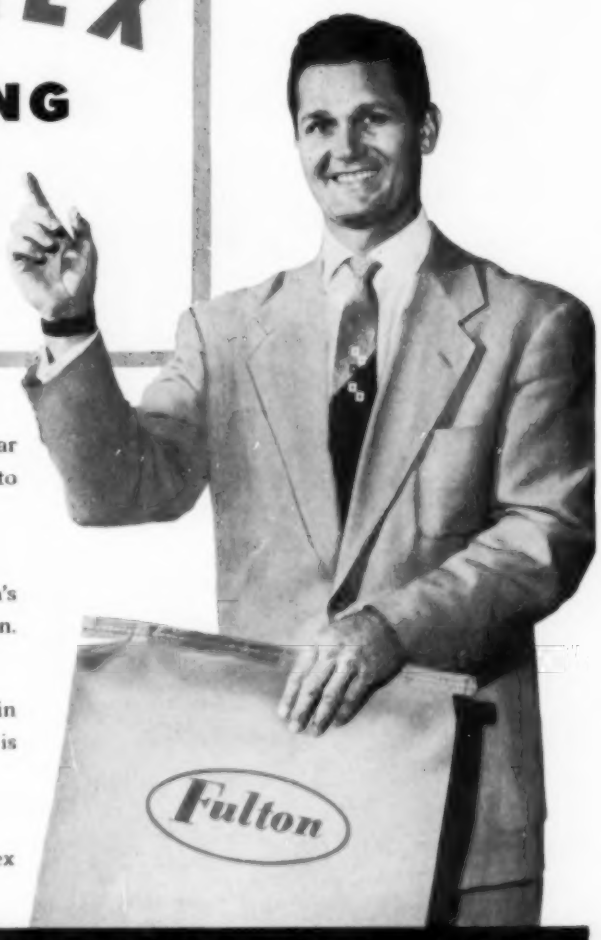

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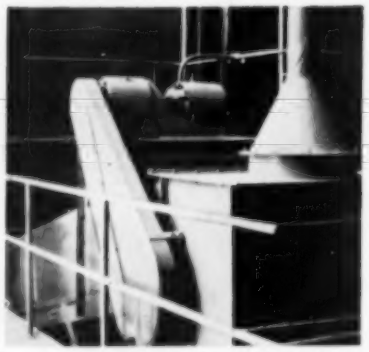

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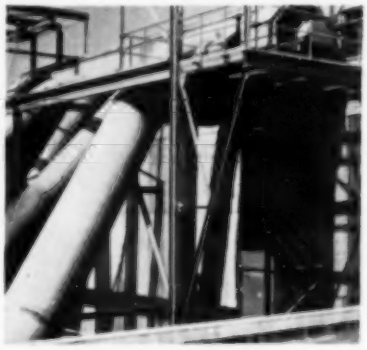

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2 lb. DDT/gal.	2.5%	2 lb. Methoxychlor/gal.	3.0%
1½ lb. Dieldrin/gal.	5.0%	4 lb. Strobane/gal.	5.0%
1.6 lb. Endrin/gal.	5.0%	8 lb. Strobane/gal.	8.0%
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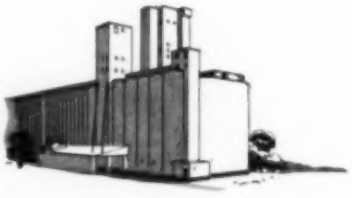

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1954 in Review

by

Paul Mayfield

Hercules Powder Company
President National Agricultural Chemicals Association

THE old maxim, "There's no business like show business" is also true of the agricultural chemicals field. Each season brings new conditions and new problems, and challenges both the resourcefulness and the patience of the industry. During the 12 months I have served as President of the National Agricultural Chemicals Association, our member companies have experienced successes and setbacks, although in general I would say that the industry has chalked up a net gain.

On the economic side of the picture, 1954 has been a slightly better year than the past two. It is admittedly a spotty season. Some materials have moved well, and some sections of the country have reported increased sales. In other areas, the effects of the drought and the always unpredictable vagaries of the weather have damaged crops beyond the ability of pesticides to salvage.

It has been a year when most companies have recognized that you cannot stay forever in business unless you make a reasonable profit. While a few continue to overlook this basic principle, in certain localities at certain times, the pesticide industry as a whole has come a long way from the days of ruinous price-cutting. The philosophy now seems to be that attention should be riveted on winning more and more farmers over to the use of these modern crop-saving materials, and in widening the market, everyone's business will be able to grow.

Creating a "favorable atmosphere" among the farmers toward the proper use of pesticides has been a prime undertaking of NAC. We can never over-emphasize the need for continuous education and public relations at the consumer level. Enactment of the Miller Bill does not mean the final chapter has been written. It is an excellent piece of legislation, written in the public interest, and it is a milestone in the development of workable standards of practice under which pesticide manufacturers can do business. But one good law does not preclude the introduction of destructive legislation, nor does it silence the propagandist who, wilfully or because he is misinformed, publishes false charges and scare stories. There will probably never come a time when we can relax our vigilance, and I believe that is a fortunate state of affairs. It will keep us on our toes and it will keep un-

(*Turn to Page* 147)

SUCCESSFUL FARMERS EVERYWHERE RELY ON TOXAPHENE...

PENNSYLVANIA—Elmer Young, Chatham, gets good control of spittlebugs on his alfalfa and clover with one toxaphene application each spring.

TEXAS—J. V. Davis, Rt. 1, Waco, finds that automatic early-season poisoning with toxaphene gets his cotton off to a good start.

MISSISSIPPI—Joe McCaughan, Sherard, depends on toxaphene to protect cotton, also uses it to stop worm infestations on wheat and barley.

GEORGIA—Royce Calhoun, Vienna, says, "Toxaphene lasts longer and does a better job than any dust we've used. In our county, more people are going to toxaphene . . ."

MARYLAND—Lester Tucker, Jr., Rt. 4, Elkton, uses toxaphene spray to protect his clover from spittlebugs, a serious threat to hay production in many states.

LOUISIANA—T. A. Calloway, Bosco, depends on toxaphene sprays for control of thrips; says "We also obtained excellent results in the use of toxaphene dust to control outbreaks of cutworms on our oats."

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THE CHEMICAL BASE FOR TOXAPHENE IS PRODUCED BY HERCULES FROM THE SOUTHERN PINE

NAVA-19

ARKANSAS—Marvin McCalman grows cotton in the Red River bottoms near Bradley. "For the last several years," he reports, "I found toxaphene has been very effective in control of over-wintering weevils, fleahoppers, and thrips . . ."

Editorial
COMMENTS

ELSEWHERE in this issue (See pgs. 34-39) we have assembled a series of comments from leaders in the agricultural insecticide field on the state of business, as we come to the end of another season. We all know too well that the picture is not a particularly cheerful one. The best that can be said is that it could have been, and some years has been worse. Some products, particularly specialties, have done well. Some areas have experienced good demand. The profit picture on the whole has been somewhat better than the two previous years. But it would take a tall lot of stretching to call '54 a *good* year.

Various constructive suggestions are advanced with a view to improving the sales and profits picture for the future. Some possibilities seem to exist for extending the selling season. Obviously the industry needs to diversify further. It must and can find more products to sell . . . more useful services to supply. New markets can be developed for new products, with the fumigant field offering one of the bright spots for the future.

On the price side, some in the industry apparently have yet to learn what would seem to be the relatively simple lesson that low prices do not sell insecticides. When a man has no fire he is unlikely to buy a fire hose simply because it is priced at a bargain level. When the market is not there, cut prices do not create one. Rather, as several of our commentators point out, they tend to retard forward buying and precautionary stockpiling of pesticide requirements for the future.

The practice of selling on consignment, if this can be dignified by referring to it as "selling," has contributed to demoralization of the market in many areas. One of our contributors points out, too, that selling through groups of distributors who make a practice of supplying pesticides to their trade at or near cost, is another unfortunate practice that makes orderly and profitable marketing of the industry's output difficult. Excessive freight allowances, sales to dealers at distributors' prices, are other indefensible practices at which the finger must be pointed. It is to be hoped that as the individual companies which have been the worst offenders along these various lines check over their financial statements this winter, the red or at least pink figures may give them pause, and perhaps suggest a change in company sales policies before another season rolls around.

For years past the agricultural insecticide business has been, perennially a business in which one year of big profits was expected to wipe out several years of accumulated losses. The best prospect for the future seems to be that more and more people in the field are becoming completely dissatisfied with such a basis of operations. They are content to make a modest profit, —but begin to recognize that they must shape their policies and so conduct their operations that they will make a modest profit in poor years as well as good. As this attitude spreads further, and as ways are found to diversify the industry's operations, and to extend the selling season, there seems to be a more encouraging outlook for the future.

And it doesn't take much to encourage an insecticide salesman. Considering the buffeting they have to take from the buyer, the home office, the weather, to say nothing of competitors, —they have to be born optimistic. "Maybe," they figure, "1955 might be that big year again. We might have that warm, moist June and July that everyone keeps talking about."

Pesticide Business Improves Slightly in '54

By J. V. Vernon

Niagara Chemical Division
Food Machinery & Chemical Corp.
Middleport, N. Y.

THE agricultural pesticide business for 1954 at this time presents a slightly improved picture as compared to the same time one year ago. Many factors have contributed to this; among them being that top management of many of the important producers have taken a good look at the overall business; there was a reduction of inventory during the 1953 season and many commodities were obtained or produced on an "as needed" basis; the increased requirements of DDT for use in foreign countries; the general tightening up on credits and collections.

Even though at this time it appears that total consumption of pesticides in our domestic market will be considerably less than in 1953, from an overall standpoint the above mentioned factors have resulted in a better basis for operations as a whole. The general drought conditions that prevailed in many of the important consuming areas have had a direct effect on tonnage consumed. There has been no forward buying on the part of the users of pesticides and in my judgment there will be little or no inventory in users' hands at the close of this season. Inventories for the most part will be owned by the basic producers and to a smaller degree by the formulators. All this has meant increased costs right along the line. Interest charges on inventories alone represent no small part, because as we close out this crop season there is little chance to put these stocks into use until another season comes around.

In many segments of our business the system of distribution that has grown up during the past several years, and no doubt of necessity at the time, is contributing considerably to the cost of doing business. It is well recognized that ample productive facilities exist to serve the needs of agriculture. The feeling exists, however, that only enough products will be produced to supply customers' needs, with a reasonable backlog supply for emergencies. This will require that at some time and on some commodities shut-down of plants will occur and the resultant shut-down expense will have to be borne by the products affected. This of necessity must come or else the industry must decide to carry higher inventories which could be all out of proportion to needs, or else orderly buying must take place and keep the pipe-lines reasonably filled in an orderly manner.

The former is exactly what we have just experienced. As a result of this practice and the necessity of finding some place to put the goods, we have "grown into" a consignment type of product distribution. Though there are no definite industry figures available at this time, it is easy to see that there is considerable expense with this type of operation that is not found in a straight "buy and sell" type of distribution. The practice of consignment has become so loose and widespread in this industry that I have no doubt that close attention will be given to it by individual members in order to improve the situation in their respective fields of operation. This added expense of doing business plus the cost of insurance, plus the added cost of product liability and product obsolescence are all a part of the reasons why a reasonable profit must be secured.

If these practices and trends in our industry are allowed to continue, they will surely in the end jeopardize the food and fiber of this country, because artificial shortages could develop in the midst of plenty and consumers might be forced to pay more for the products they need than is necessary.

The pesticide business is an essential business. It is essential to the health and welfare of our civilization in order to maintain our high standard of living and to lend valuable assistance to our friendly foreign nations. Unless we keep the industry strong and healthy, serious impairment to our way of life could result.

A Report from the Southwest

By C. M. Meadows

Southwest Sprayer & Chemical Co.
Waco, Tex.

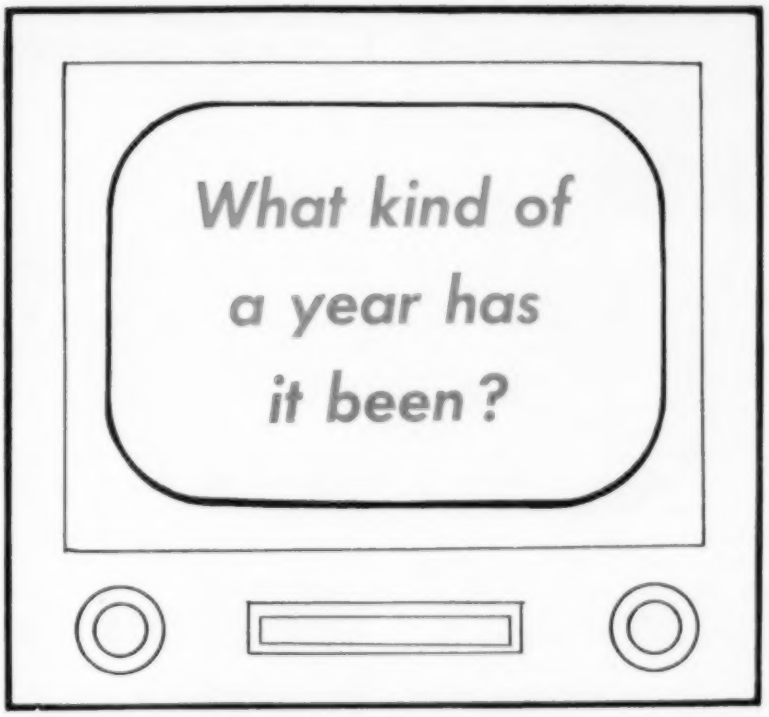
THE demand for agricultural chemicals in the Southwest has been low to moderate in 1954. Supplies have been adequate to take care of all situations, however if excessive infestations had developed, outside shipments would have been necessary. BHC and aldrin were much in demand the latter part of May and June. BHC was used to combat lice on cotton. These aphid, or cotton lice developed as a result of cool weather. Aldrin, of course, was used effectively against the grasshopper which was a major pest this season. Toxaphene remained high on the list as a good all-round cotton insecticide. Other insecticides, heptachlor, dieldrin, endrin, etc. were in moderate demand.

Profits have as a whole been better than in 1952 and 1953. In the past few weeks some excessive price cutting has occurred and there have been a number of special deals to move consigned stock. However, it should be noted that some companies which have in the past availed themselves of this method of reducing inventory, have withdrawn from the market in those areas and have refused to go along with the practice this year.

The demand for agricultural chemicals has always been closely associated with ecological factors and not economical figuring. 1954 has seen a trend to a more conservative attitude, with more widespread evi-

dence of a tendency to insist on at least a modest profit in agricultural chemicals. Changes are still needed, but a start has been made and some order is beginning to develop from the unwieldy chaotic situation of a gigantic business with no organization or planned objective in mind.

The old idea of making huge profits during heavy insect infestations and balancing them with low profits or losses during years of mild or sub-normal infestations seems to be on its way out. The ability of manufacturers through modern transportation methods to put huge amounts of chemicals into areas where peak infestations have developed has eliminated to a large extent the vacuum of chemical shortages, with its corresponding price gouging of the consumer. This was evident in the recent cutworm situation which existed in the midwest. The agricultural chemical industry, if it is to continue to develop, must satisfy itself with making a constant mod-



Industry leaders report on 1954 pesticide sales. Record spotty, but prices somewhat better than previous years. Drought cuts demand sharply.

erate profit and get away from the idea of balancing its books from red to black as a a result of excessive high infestations and peak profits in one year out of five.

The agricultural chemical industry needs new personnel in key positions who will operate on the business principles of successful operations; that is, it is better to make a modest profit in an orderly fashion than to sell at such low prices that there is little or no profit. This occurs when a concern has huge stocks of consigned materials in the hands of the trade and as these stocks show little movement, the company becomes jittery and desires to dispose, liquidate, or in any way transfer this stock into liquid assets. It is easier to explain low profits or a loss to a board of directors than it is for a sales manager to take the blame for large stock of carry-over chemical inventory.

Expanded diversified agricultural chemical needs in the Southwest should help to stabilize the industry. The trend toward complete mechanical farming is creating new chemical needs and will tend to fill in and extend the season for the insecticide manufacturer. Pre-emergence and post-emergence weed and grass control is but one example of broadening fields for chemicals and machinery. Chemical weed and brush control in improved pastures is increasing each year. Chemicals for use in harvesting a crop are getting a bigger play. Three to six dollars per acre for defoliation of the cotton crop is another extended market. There is a growing demand for chemicals to protect stored commodities. Insect control on livestock is developing into a major item. Home and garden chemical needs are expanding.

Better cooperation between manufacturers and formulators, better education of the consumer by the trade, a utilization of diversified markets for insecticides, and a realization that the agricultural chemical business is emerging from a moderate to a large business operation; all of these factors must be properly evaluated in order to develop a stable and profitable business operation for the industry.

Marketing Is Our Weakest Link

By J. M. Taylor
Taylor Chemical Co.
Aberdeen, N. C.

AS I come to the end of my twenty-seventh year in the manufacture and sale of pesticides my enthusiasm is somewhat dimmed by the condition of the industry. We have a good industry and our products have reached a new high in pesticide control since the war. A farmer today can get scientific help and an efficient product to meet most any pesticidal problem

The 1954 pesticide season has been a poor one, and unless the industry corrects a lot of the mistakes made this year we're in for more trouble. Our weakest link is marketing and I might profitably mention a few of the things we did this year that helped to make the season as bad as it has been. Marketing and prices are tied together, but we ought to recognize that prices are our greatest weakness. There are too many members of the industry who seem to think that a lower price will move more pesticides. It does not work that way, and unless we as an industry learn the price facts of life, our profits will continue to dwindle. Bargain sales will ruin us quicker than any other one thing.

When a price is cut, it may temporarily shift a little tonnage from one producer to another, but it does not increase the total amount used and usually only means that the buyer will buy from his regular supplier at the lower price. We ought to train our entire organization to realize that the only factor that will increase consumption of our products is pests and weather. The farmer will use our products when he sees damage from pests, and he'll have to use them more often in wet weather. He will not pay 5¢ for a 10¢ product unless he needs it to protect his crop. Entirely too many in our industry (from top management down) think that if 10¢ won't get the business 8¢ or 9¢ will.

That brings me down to inventories. We must stockpile pesticides if we are to produce efficiently. When will we learn that we must hold those inventories until pests create a demand and no matter what the price or how much the sales effort, we'll have to hold inventories until the farmer wants the products?

Our company has just finished a year when we saw prices cut unnecessarily, exorbitant freight allowances which are nothing but price cuts, dealers made into distributors (just to give them a lower price); and sales managers trying to move inventories rather than hold them until pests created a demand. Our company has seen the big commpanies fight one another and the little mixers fight each other until there wasn't anything left for profits. I'm hoping that all of us will learn that what hurts the pesticide industry hurts each member. We as a member are black and blue from unnecessary slugging, but still hoping that, another season, we may all get around to fighting bugs instead of each other.

'54 A Big Year For Toxaphene

By Richard Yates
Hercules Powder Co.
Wilmington, Del.

AS a result of relatively light insect infestations in most of the cotton belt, apparently 1954 will again be a mediocre year for cotton insecticides. However, there are some bright spots, notably the far west. The use of cotton insecticides in this area has been good during the past few weeks, and currently is running well ahead of the past two years in spite of reduced acreage. This demand has helped the far west enjoy good business at reasonable profitable levels and has reduced inventories to a minimum.

In other sections of the country, demand for pesticides in general has been good. More specifically, damaging outbreaks of garden webworms, chinch bugs, grasshoppers, spittlebugs and other insects have occurred. Severe infestations of various types of cutworms and armyworms in the midwest, northeast, and some sections of the south and far west, have called for emergency chemical control measures. As would be expected, these widely diversified uses for insecticides in scatttered areas all over the country have resulted in substantially increased sales of toxaphene during 1954 as compared with 1953. This reflects the continuously expanding types of insects for which toxaphene is recommended. It also points up the problem of having ample stocks on hand to take care of such emergencies, and emphasizes the need for insecticide manufacturers to carry ample stocks at centralized plants and warehouses from which local areas can be quickly served.

This improved sales volume of toxaphene has currently brought our stocks down to the lowest practical point. Formulators and dealers also report relatively low stocks of finished toxaphene insecticides, but generally seem to have on hand sufficient material to meet adequately, spot local requirements. This is considered quite healthy now that we are approaching the end of the active season in the U. S.

Labor, raw material, and research costs for the manufacture of toxicants have now increased to the point where it is essential that the industry consider seriously whether or not the price of the toxicant reflects a sufficient profit to encourage continued participation by these manufacturers

in the agricultural chemical business. We believe that unless some adjustment in price is made, there will be a tendency on the part of some companies to consider seriously getting out of the insecticide business because the risks and costs involved are too great to justify continuing in a business where the profit margin is so small.

Are We Beginning To Learn?

By J. Newton Hall

Pioneer Chemical Associates, Inc
Denver, Colorado

AFTER spending the past several months visiting with insecticide processors and distributors in the west and southwest, this reporter is of the opinion that 1954 may prove to be a "good" season for the agricultural chemicals industry. Please note the use of the quotation marks. The reference is not to profit; neither is it to volume of sales; rather it is to the few encouraging signs on the horizon that an increasing number of our contemporaries are beginning to realize that prices are important. In fact, it appears that some industry leaders are already of the belief that prices are almost as important as moisture and insect infestations. If this feeling is beginning to spread, we may indeed be making some progress at last—and can perhaps mark 1954 down as a good season for our industry after all.

A 1954 box score for the west and southwest would show that most of the States in these areas had very poor moisture conditions, that most of the area experienced very low infestations of pests, and that in all of the States, with the possible exception of Arizona, the price picture was bad. No matter to what extreme one might go in breaking down the various market factors and attempting to analyze them in detail, little relationship would be found among these three basic factors. In areas where lack of moisture reduced crop acreages to new minima, prices were poor, yet in places where infestations were heavy, often the price picture was equally as bad.

The season appeared to be one, not of new products, but of frequent switching from one to another of the established chemicals. Areas which had been large users of esters for weed control seemed to swing over to amine; growers who had used one insecticide for alfalfa weevil switched to a different chemical, and vice versa. The same shifting of products seemed to prevail in many of the cotton areas, and no one has given a logical explanation for this trend toward substitution of one product for another.

Another characteristic of the season seemed to be the absence of any large or heavy movements of pesticide materials save for the activity which accompanied the big outbreak of army worm in Minnesota and the Dakotas. A great deal of publicity was given to grasshopper infestations and damage, and to aphis and mites in such areas as central New Mexico, and to miscellaneous infestations here and there, but there were no heavy tonnage or "big run" movements worthy of the name. Some processors now consider this kind of business as normal, but all keep looking for the one "big run" to put them over the top.

Perhaps the grasshopper project in Colorado this season represents a typical example of the farmer's attitude toward cooperative pest control programs particularly in the west. Although the federal and state governments offered to make all the arrangements,—and to pay two-thirds of the cost, only some 10% of Colorado farmers decided to go along with the project. They were willing to risk severe damage to their rangeland, rather than to put up the few cents per acre which would have guaranteed them protection. With improved moisture conditions, they may pay heavily next season for their indifference this summer, but it would not be the first time, nor will it be the last.

In mid-July a leading Texas formulator said, "It looks like another 1953." Our crystal ball says that he will repeat the statement again about the same time next year; however our crystal ball has yet to be right.

Price Cuts Retard Forward Buying

By J. H. Kennedy

Stauffer Chemical Co.
New York, N. Y.

ANOTHER season is drawing to a close and once again profits in the agricultural chemical business have been confined largely to "specialties" marketed by a single or very small group of manufacturers. While the profit picture improved slightly this year in comparison with the past two years, the improvement was confined to certain areas. The over-all picture is still most unsatisfactory.

Staple items, as well as formulations generally, were sold on a very narrow margin of profit. We have witnessed again the anomalous situation where formulations made from products actually in short supply were being offered at prices very close to actual cost.

For large volume, the industry still looks to the areas in which cotton is the principal crop. Contrary to expectations, the infestation of pests attacking cotton has been spotty this season and as a consequence demand for insecticides has been very

light. Prolonged hot, dry spells in many areas also contributed to the lack of demand for "cotton poisons".

As a result, there is at this writing a large stock of raw materials and finished products in the hands of many factors serving the agricultural field, and during the past month there has been a marked weakening of prices.

In attempting to serve the agricultural field, manufacturers are confronted with many variables over which they have no control. Accordingly manufacturers frequently are compelled to carry over excessive inventories into the next season. The industry is confronted with this problem again this year, and in an effort to move inventories many resort to lowering prices. Everyone connected with the industry will agree that lowering prices does not stimulate demand when there is no infestation. Such tactics, however, discourage and retard forward buying, on which we are so dependent as an industry if we hope to be able to cope with the demand in a normal year.

Industry Must Diversify Sales

By Theodore Riedeburg

Theodore Riedeburg Assoc.
New York

THE record of the pesticide business this past season reminds us of the story being circulated around New York concerning a new idea for a TV panel show. Each contestant is provided with a fifth of Scotch to imbibe during the half hour stint. Just before the program signs off, any contestant who can guess his own name wins the jackpot. After a few moments of meditation, the obvious parallel can be drawn. Following the disappointments of 1954, there must be quite a cross section of the trade which would enjoy making a guest appearance on such a show, providing it lasted for at least an hour and a half.

In all seriousness, we would like to point out that the industry is beginning to get a bit weary of having to submit to vagaries of the weather. It looks to me as if some of your friends and ours have "had it" to the point where they are going to spend some time during the next few months figuring a way out of the proposition that one good year takes care of six or seven bad ones. Maybe it does, but that is a long time between collard greens and roast beef.

One of the answers to better "in season" profits may come from the infant soil fumigation deal. It has been estimated that not more than one percent of the total acreage which requires applications of fumigants for both wireworm and nematode control has been treated up to the present time. This year, both DD and ethylene dibromide shared equally in the soil fumigation market. The total number of pounds of these two chemicals which were applied to areas under cultivation for tobacco, potatoes, lettuce, celery, carrots, onions and tomatoes ran into the millions and one informed source advises that DD was underproduced by approximately 3,000,000 pounds. Most important is the fact that those firms who are marketing soil fumigants are getting a profitable return for their efforts.

It should not be too hard to sell growers on the benefits of soil fumigation. For example, the enhanced yield of a tobacco crop, grown on land previously infested with nematodes, and treated with DD, shows a return to the grower of $10.00 for every dollar invested. In vegetable crop production, the return is approximately $2.00 for every dollar invested in fumigants. It is conceivable that, within the next few years, a market can be found for up to 600,000,000 pounds of toxicants for the reclamation of infested soil.

A second approach to the stabilization of our pesticide formulating economy may be found in diversification. There has always been the feeling that we all deserve to be able to put our feet up on our desks after a tough season, good or bad, and sit around for three or four months, planning the next year's program and hoping that the weather will be favorable enough to let us do the bug killing. That philosophy may be fine when there is money in the bank but, too many times, assets are necessarily calculated on the basis of inventories and accounts receivable.

How then can the selling year be extended? To our way of thinking, there is no reason why pesticide manufacturers, both large and small, cannot produce specialty chemical formulations which can be given a maximum amount of sales effort during the off season. It is possible that the off season sales effort on the part of regular sales personnel could be supplemented by additional help during the Spring and Summer, providing, of course, that proper attention be given to distribution, advertising and promotion during the early stages of marketing. Most companies are familiar with the handling of solvents and they have all the necessary equipment available to produce and package innumerable formulations which could be sold to various industries through established distribution channels and, with a bit of initiative, through outlets which, in the majority of rural areas, have been virtually untapped by those who have been established in this field for many years.

Why not make detergent sanitizers, soapless hand cleaners, protective industrial creams and lotions, water treating chemicals and bactericides available to industrial plants which are practically in the backyards of our manufacturing facilities? Here is one idea to consider.

Watch for a new development related to the treatment of soil which should be announced soon. Agronomists have found that the use of as little as ten pounds per acre of a low cost surfactant enhances capillary moisture movement in soils which normally do not produce a good crop. The materials tested reduce loss of water through run-off, cut down loss of moisture from evaporation, increase percentage of seed germination, aid plant emergence and make plant foods more readily available. Applications would be made just before planting or after harvest so this could be a lucrative off-season item.

It would not take much effort to explore the potentialities for market-

ing specialties in any given area and the answers which could be obtained from analyzing them might point the way to a sales curve which would look better than a profile of the roller coaster at Coney Island.

Better Than Normal in East

By J. H. Buchholz

Cooperative Seed & Farm Supply Service
Richmond, Va.

THE current season has seen a somewhat better than normal demand for insecticide materials in the central eastern states of Maryland, Delaware, Virginia, West Virginia, Kentucky and Tennessee. The heavy overall infestation of insects predicted at the beginning of the season has been reduced to some extent by the drought conditions which have prevailed through the major portion of this territory since early June. However, although in many areas populations of garden insects have been reduced, earlier predictions of heavy infestations have certainly proved correct in respect to many insects attacking field and forage crops. Cut worms, army worms, aphids, leaf hoppersfi alfalfa weevils, grasshoppers and mites have been or are currently causing wide-spread damage. The great prevalence of these insects plus the experiences of last year with spittle bugs and other insects have resulted in large demand for materials for their control. This year has also been marked by increased use of pesticides for control of tobacco insects, particularly in Kentucky.

At this writing, dry weather is causing injury from mites, leaf hoppers, aphids and grasshoppers to become more and more apparent, resulting in a current step-up in use of control materials for these pests. In addition, mites are becoming a problem in some legumes, and the alfalfa weevil is a widespread economic factor in Virginia for the first time. From here on out, even if dry weather conditions persist in this area, there will be continued general use of materials for control of the above mentioned insects to the extent that the problems of residue hazards will permit. Materials having a low order of toxicity to warm-blooded animals should be in greatest demand.

The trend toward the use of emulsion concentrates for low gallonage application is continuing to make inroads on other types of materials. The change over is more noticeable in its effect on wettable powders and to a lesser extent on dusts. The main conversion from dust to sprays on large commercial acreage occurred years earlier and the remaining usage of dust, which is mostly on gardens, is not being materially affected. Actually we have experienced an increase in demand for dust so far this year in spite of the fact that dry weather has reduced the insect problem on garden crops.

If we were to pick out the insecticides which have shown the greatest increase in demand this season, we would naturally think of endrin, TDE, and aldrin for control of tobacco insects, toxaphene on spittle bug and army worm, and last but not least malathion for fly control and for control of general garden crop pests. We feel that the outstanding demand and acceptance of captan among orchardists is particularly worthy of note, and future developments in its use on many crops will be interesting to watch. For example, it is being tried on a commercial scale on peanuts in Virginia at the present time. As far as garden fungicides are concerned, the demand for zineb has probably been as widespread as any material available.

Up until now supplies of most materials have been adequate, with only very temporary shortages of a few materials due to sudden area demand. Rotenone has not been too plentiful, but there were few, if any, cases where requirements could not be met. Latest reports of insect activity would indicate use of some materials could be heavier than normal for the remainder of the season.

Prices have been reasonable and remained relatively stable throughout most of the season, with area price problems being at a minimum. Present stocks seem to be adequate but not excessive on most materials. We anticipate very little change in the general market situation for the balance of the season.

I think that manufacturers and mixers in this area will be able to consider this season as rather satisfactory, taking all factors into account.

Good Year For Specialties

By John Stoddard

Prentiss Drug & Chemical Co.
New York

THIS year the Agricultural Chemical field can be summed up in two words, — optimistic and unsatisfactory in terms of tonnage movement. This is an over-simplification, but adequate for our purposes.

The year started on an optimistic note, with sales excellent and every prospect for large tonnage movement of pesticides. It is ending, as in 1953, with an unsatisfactory sales record, largely because of climatic conditions. Because of drought in the South, Mid-West, and parts of the Eastern coast, no major insect infestations have developed during the past few months. Consequently movement of the tonnage agricultural insecticides has been below average.

(*Turn to Page* 134)

Foreign Operations Administration technical program

THE tremendous expansion of agriculture in the United States over the past twenty years has gone hand in hand with expansion of the agricultural chemical industry . . . and has also paralleled the wider distribution among farmers of knowledge of and training in the use of these important chemical tools. Continuing expansion in rates of crop yields is recognized as the direct result of (1) education of the farmer as to the requirements of his land, (2) acceptance by the farmer of efficient agricultural practices and equipment, and (3) most of all, the tremendous job done by the agricultural experiment stations in analyzing the problems and requirements of local areas, and conducting the necessary research, experiments and field trials to meet various needs. The role of industry in developing new and improved chemicals for control of pests and plant diseases has, of course, also been extremely important. The development of these new chemicals has opened a completely new and specialized field of pest control.

The fact remains, however, that soil and pest problems have always existed, that agricultural chemical products were as much in need 50 years ago as they are today, but that the farmer . . . the ultimate user . . . had to be shown and educated to the fact that crops require a balanced diet for most vigorous growth, that plant diseases can be curtailed, resisted and controlled after the cause of the disease is recognized and control is directed to the source vector; that pests are better controlled by specific insecticides, many of which have been discovered only in very recent years . . . and that agriculture is basically a highly scientific industry.

In recent years, agricultural education has made great headway in the United States, and farmers are ready and anxious to learn of improved and more efficient agricultural chemical products and practices . . . thus the market for agricultural chemicals has now become one which depends largely on the extent of insect infestation, weather conditions, and decision of the user to apply optimum soil nutrients for most efficient yields.

The foreign market, however, has remained relatively undeveloped, because the need for use of these materials, and the "know how" connected with their use, have been lacking abroad. Our South American and European neighbors have not, as yet, fully realized the important role of many of the agricultural chemical aids, whose availability and use are taken for granted in the United States. But here, again, much will depend on demonstration and education of farmers around the world.

With this in mind, U. S. business has readily approved the world wide Federal Government technical cooperation program which currently operates at a cost of some 100 million dollars a year, and is directed to countries exhibiting dynamic possibilities for development.

The current project is called the FOA (Foreign Operations Administration) technical cooperation program. It is directed by Harold E. Stassen, and involves contracts made under TCA, MSA and ECA. Technical cooperation with Latin America, for example, has been underway for more than 12 years. The broad objectives of the program are designed to allow the countries involved to achieve a sounder and more diversified economic foundation.

Priority is given to those activities which most immediately assist in

accomplishing the high priority aspects of the specific country's economic development program, and these activities are coordinated to achieve the broadest range of impact. General fields of activity cover agriculture, home economics, health, housing, community development, industrial development, public health, sanitation, business administration, teacher training, etc.

As Harold Stassen indicated in an address before last year's convention of the Association of Land-Grant Colleges and Universities, in Columbus, Ohio, the U. S. Federal Government is prepared to enter into long term contracts with the land-grant colleges in the United States in relationship to specific underdeveloped countries and the educational institutions within those countries. The contract is not rigid, and allows considerably flexibility to adapt it to specific requirement of the different colleges and countries involved. In some instances, subcontracting by the principal institutions is permitted, in order to mobilize additional technical resources within the United States. The contracts generally cover a three year period, coincident with the school year.

Although the U. S. government pays the full cost of the program, the actual supervision, decision as to what projects are to be developed, etc, in other words, the entire scope of the cooperative activity, lies with the institution under contract. Furthermore, it is necessary for a land grant college in the United States to express an interest in working with some particular country on the technical cooperation project to initiate the negotiations of opening a contract. Where a foreign country is interested in entering the cooperative project, it is necessary that a land-grant college in the United States be willing to enter the program.

Some 20 countries of Europe, Latin America, the far and near East, Asia and Africa are cooperating with 30 universities in the United States in the FOA-financed contracts. The activities cover various programs of development, including agriculture and agricultural engineering. The agricultural contracts are listed in the table on this page. In future issues of AGRICULTURAL CHEMICALS, we plan to review the work being done by individual colleges and the countries with which they are working.

The first such report will review the project in which Cornell University is working with the University of the Philippines, where a considerable amount of work has been done with disease control sprays, and on fertilizers. Succeeding reports will consider some of the other projects of specific interest to the agricultural field.★★

FOA-Financed University Contracts in Operation

Country	Host Country Institution (s)	U. S. University
Afghanistan	Government of Afghanistan	Wyoming Univ.
Brazil	Rural University of the State of Minas Gerais at Vicosa, Brazzil	Purdue Univ.
British Guiana & Surinam	USOM	Univ. of Maryland
Colombia	National University of Columbia a. Facultad de Agronomia del Vallee at Palmira b. Facultad Nacional de Agronomia at Medellin	Michigan State College
Ethiopia	Government of Ethiopia	Oklahoma A & M
India	Allahabad Agricultural Inst.	Illinois Univ.
Iran	Rural Development Board of Iran	Utah State College of Agriculture
Iraq	Government and Iraq and Abu Ghraib Agricultural College	Arizona Univ.
Israel	USOM	State University of New York
Pakistan	Punjab University & others	State College of Washington
Pakistan	Tezgoan, Ah Sanullah, Dacca, Chittagong	Texas A&M
Panama	Panama Ministry of Agriculture and National Institute of Agriculture of Panama at Divisa	Arkansas Univ.
Philippines	University of Philippines	Cornell Univ.

Summary of All University Contracts

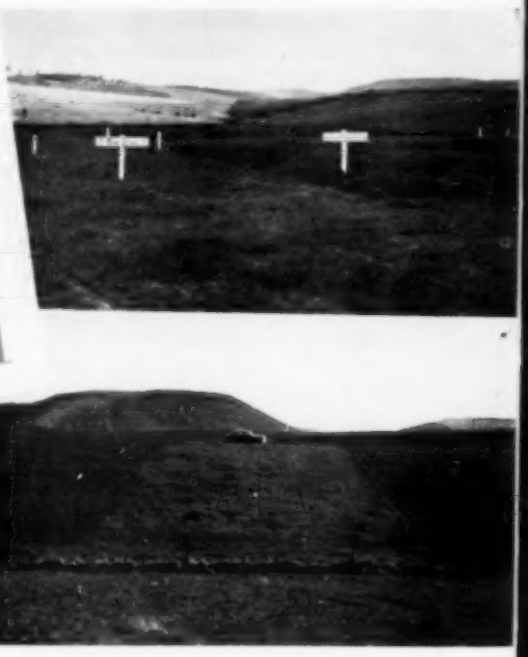
	Number of Countries	Number of Universities	Number of Contracts
Latin America	7	6	7
Europe	1	1	1
Near East, South Asia and Africa	9	17	21
Far East	3	6	7
TOTALS	20	30	36*

*The figure of 35 contracts in operation reported in April 19 report on this subject on a comparable basis would be 27. Five separate AUB contracts have now been consolidated into one and four contracts have terminated. A total of nine new contracts have been signed since April 19, 1954.

MOLYBDENUM

OPENS NEW MARKETS

By C. H. Kline
Climax Molybdenum Company
New York



Top photo: In the test area at Inverna Research Station, New Zealand, two tons of limestone per acre gave little growth of clover in the plot on the left. The plot on the right produced a dark vigorous growth of clover after treatment with ¼ ton limestone and 2½ ounces sodium molybdate.

Bottom photo: Molybdenum treatment has increased alfalfa yields in Waitaki County, New Zealand up to 500%. The pale center area was not treated.

MOLYBDENUM — sometimes called "moly" for short — is revolutionizing fertilizer practice on the other side of the world. This trace element was first proved essential to plant life at the University of California in 1939. But it remained for experiment station workers in Australia and New Zealand to show since World War II that large acreages of cropland could be dramatically improved by treatment with molybdenum. Formerly much of this land was too poor to warrant treatment with fertilizers or other agricultural chemicals. Today it provides a major new market for these products.

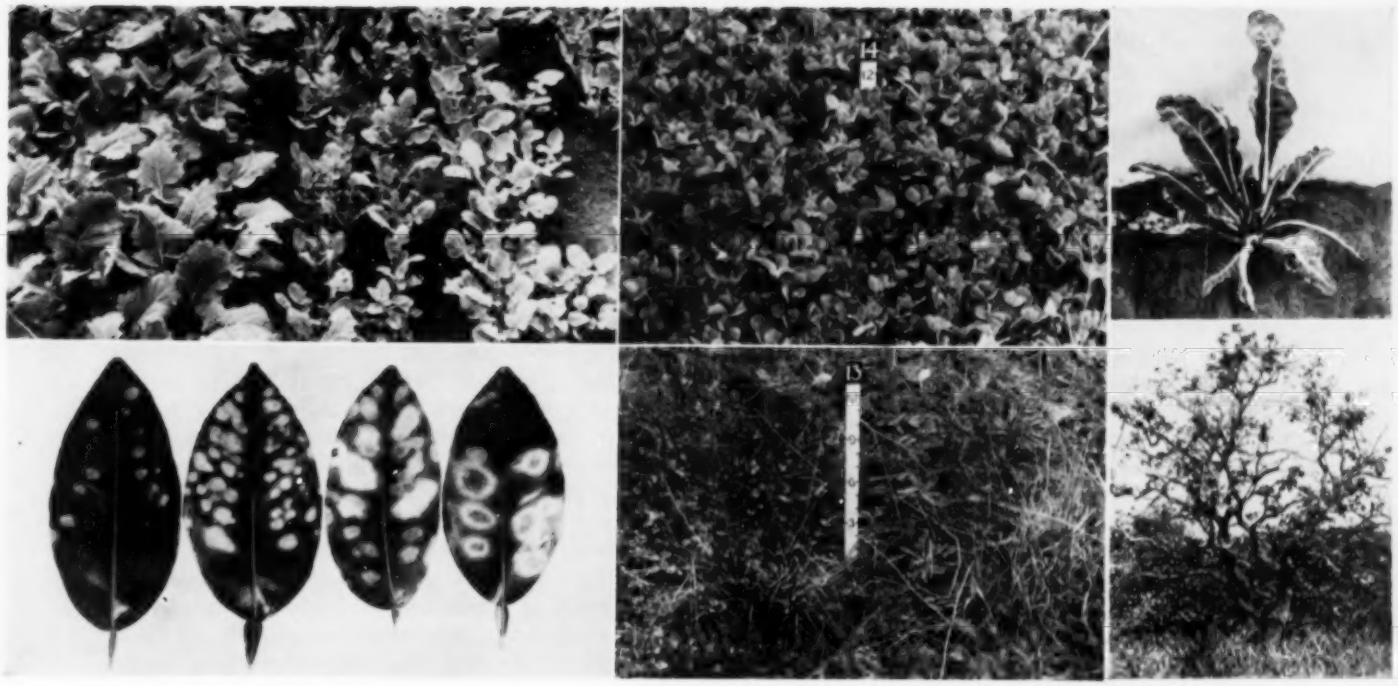
Acid grazing-lands in the New Zealand hills and on the Australian tablelands are good examples of this transformation. Originally the soils of these areas could support only poor native pastures. Clovers and other desirable forage legumes were difficult to establish, and they quickly died out. On many soils, heavy liming was the only way to get good legume stands; but on rough country — and especially where land was only partly cleared — applications of limestone were far too expensive to be justified. As a result, these poor areas got neither limestone nor fertilizer.

Research workers found that in many cases lime was not needed for the crop itself, but rather for its solubilizing effect on soil molybdenum. Under acid soil conditions, molybdenum is often fixed in a form that is unavailable to the crop. Liming counteracts soil acidity and thus releases molybdenum in an available form. Of course, lime has other functions in the soil as well. It makes phosphate more available, supplies extra calcium to the crop, and aids in regulating the uptake of other elements. Nevertheless, large areas are known where the principal need for liming is to release soil molybdenum.

In these areas, treating the soil with molybdenum has greatly reduced — and in many cases entirely eliminated — the need for liming. For pasture and hay legumes *two ounces* of sodium molybdate an acre may replace *several tons* of limestone. Sometimes lime is needed too, but in greatly reduced amounts. In some parts of New South Wales, only 200 lbs. of limestone an acre proves to be sufficient when molybdenum is used.

Most of the land that needs molybdenum also needs phosphate. Accordingly, a mixture of sodium molybdate and superphosphate is widely used under the name "molybdenized superphosphate." The amounts of this mixture required are so small that they may be applied economically by airplane. In several regions, aerial seeding of clovers and aerial topdressing of molybdenized superphosphate have raised the carrying capacity as much as 500%—for example, from one-half sheep an acre to three sheep.

The airplane and molybdenum together have thus opened up an important new market for superphosphate. In New Zealand, for example, the first conclusive benefits from the



Top left photo: Crucifers often respond to molybdenum treatment on acid soils. Untreated area is shown at right. Left area of rape field received 3 ounces sodium molybdate per acre. **Photo, New Zealand Dept. of Agriculture. Bottom left:** Yellow spot in citrus, first identified as a case of molybdenum deficiency in Florida in 1951. **Photo, Florida Citrus Exp. Stat.**

Top center: This thick stand of clover received two ounces per acre of molybdic oxide. **Bottom center:** Without lime or molybdenum this plot in the New South Wales Tablelands has failed to develop a vigorous stand of subterranean clover after four years. **Both photos, Commonwealth Scientific and Industrial Research Organization.**

Top right: Whiptail of cauliflower is often the first indication of molybdenum deficiency in a given area. **Photo, Florida Potato Investigations Laboratory.**

Right bottom: Yellow spot in citrus, causes severe defoliation and poor yields. **Photo, Florida Citrus Experiment Station.**

use of molybdenum on pasturelands were obtained in 1950. During the current year, it is estimated that some 500,000 acres, nearly one per cent of the total land area of the country, will be treated with molybdenum. Roughly three-quarters of this area will receive molybdenized superphosphate. As a result, New Zealand producers will sell perhaps 30,000 more tons of superphosphate, an increase of about four per cent in the total consumption of over 750,000 tons annually. In Australia, there are possibilities of treating tens of millions of acres that are now virtually worthless and thus opening up a new market for several million tons of superphosphate annually.

Dust and spray treatments of crops with molybdenum are also opening new markets to the formulator of agricultural chemicals. For example, in Florida spray treatments with sodium molybdate have recently been introduced to cure "yellow spot" of citrus. This disease, named for the characteristic yellow areas between the veins, causes severe loss of foliage and sharp drops in yields. It could be prevented only by heavy applications of liming materials until Ivan Stewart and C. D. Leonard of the Florida Citrus Station first identified it as molybdenum deficiency in 1951. The use of sodium molybdate in the spray program has now almost completely eliminated the disease. It is estimated that between one-quarter and one-half the total citrus acreage in Florida was treated with molybdenum in the 1953-1954 season. The sodium molybdate is applied with either lime-sulfur, wettable sulfur, copper, zinc, manganese or other insecticidal, fungicidal, and nutrient sprays.

Foliar spray applications have been widely used in Australia and New Zealand on vegetable crops, and even on pastures and such field crops as clovers, alfalfa, rutabagas, and wheat. In a few areas, sodium molybdate is also dusted on by air. The salt is generally mixed with a little ground limestone or other inert material to give greater bulk. Treatment of the seed by dusting or soaking has also been employed successfully.

Recognizing Starvation Symptoms

MOLYBDENUM performs several essential functions in the growing plant. In clover and other legumes it is required for the fixation of atmospheric nitrogen by the bacteria in the root nodules. Without molybdenum, nodules form, but the bacteria do not function. Plants show typical symptoms of nitrogen starvation — pale color, stunted growth, and low protein content. In all crops, whether legumes or non-legumes, molybdenum is required for the reduction of nitrate nitrogen in the

leaves. Recent research suggests that molybdenum may also be essential to the formation of chlorophyll and to several plant enzyme systems.

In non-legumes, the principal effects of molybdenum deficiency are an accumulation of nitrate in the leaves and apparently a low content of chlorophyll. The first symptoms are usually poor growth and an overall mottled pale yellow color. Later, yellow spots appear between the veins or around the margins of the leaves. The tissue in these spots eventually dies, leaving scorched areas. In many species the affected leaves often curl or cup upwards around the margin. In cauliflower and related crops, the leaf tissue develops irregularly from the midrib, causing the deficiency disease known as "whiptail."

Symptoms like these, of course, may develop from deficiencies of other trace elements, from insect damage, or from other plant diseases. Only actual field trials can determine definitely that any given crop requires added molybdenum on any given soil. But the record suggests that there may be a great deal more molybdenum deficiency than has been recognized previously.

Yellow spot, for example, had been known for almost fifty years in the Florida citrus groves before its true cause was found. Similarly, for years the only known remedy for whiptail of cauliflower was heavy liming. Not until 1945 was this disease shown to be a molybdenum deficiency. Today cauliflower and other crucifers can be grown successfully on fairly acid soils if sodium molybdate is applied at the rate of ½ pound to 1 pound an acre.

In general, crops that usually grow best on soils with a fairly high pH appear to suffer most from molybdenum deficiencies. Among the forage crops, alfalfa, clovers, and other legumes have the highest requirements. Grasses and cereals show deficiencies less frequently. Of the horticultural crops, cauliflower, broccoli, brussels sprouts, turnips, and rutabagas are especially responsive. Lettuce, tomato, spinach, pumpkins, squash, and melons also have high molybdenum requirements. Ornamental crops have not been well investigated, but roses have given marked responses to spray applications, and a few other flowers and shrubs have shown improved growth and color from molybdenum treatment.

Protecting Stock

CARE is necessary to prevent over-application of molybdenum on grazing lands since a high molybdenum content in forage may induce a copper deficiency in ruminants. The potentially dangerous level of molybdenum depends on the copper content of the forage, but it is generally above ten parts molybdenum per million of dry material. In cattle, this induced copper deficiency is characterized by anemia, deterioration and bleaching of the coat, scouring, and overall unthriftiness. In sheep, its symptoms are lack of coordination in the gait, brittle bones, and general debilitation.

This disease is most likely to occur on peat or on alkaline soils where molybdenum has accumulated from drainage waters. It can be cured readily by topdressing the pasture with copper sulfate or by adding a copper salt to the feed, to salt licks, or to the drinking water.

Although no cases are known in actual farming practice where topdressing pasture with molybdenum has caused this disease, nevertheless research and extension workers recommend limiting the rate of application on pasture to a few ounces an acre. Furthermore, they recommend that the treatment be repeated only after four to six years.

Curiously enough, where the molybdenum and sulfate contents of forage are low, ruminants may accumulate too much copper. Chronic copper toxicity in sheep is widespread in southeastern Australia. The proposed treatment includes topdressing the pastures with molybdenum and supplying inorganic sulfate in salt licks.

Identifying Deficient Soils

AS noted above, molybdenum is easily fixed in an unavailable form under acid soil conditions. Accordingly, responses to molybdenum treatment have most frequently been obtained on acid soils, especially those that are:

1. High in iron oxides—for example, red loams and clays and lateritic types
2. High in available manganese
3. Newly brought under cultivation from pasture or wasteland
4. Heavily dressed with sulfates, such as gypsum and sulfate of ammonia

A few soils are low not only in available molybdenum but in total molybdenum as well. These are usually highly leached soils in areas where sloping contour or sandy texture assure good drainage. Sometimes, neutral to alkaline soils that have been derived from limestone or serpentine have very low molybdenum contents. Molybdenum deficiency has been reported on one soil that analyzed 70% calcium carbonate. Under these alkaline conditions molybdenum is readily soluble, and very little rainfall is necessary to remove it by leaching. Heavy cropping, especially by cereals, also tends to deplete the molybdenum supply.

In general, molybdenum deficiency is *not likely* to be found on the following types of soils:

1. Highly productive, fertile soils
2. Heavily limed or manured soils
3. Alkaline soils in regions of low rainfall
4. Peat or muck

Selecting Rates of Application

THE various soil types require different rates of application of molybdenum. In general, however, the following amounts of sodium molybdate (anhydrous) have proved satisfactory:

	Ounces/Acre	*Frequency*
Pasture and forage crops	2	each 4-6 years
Field crops	2	Annually
Horticultural crops	8	Annually

There is little danger of toxicity to the plant from heavier rates of application. Only on forage, or on cropland where the rotation includes pasture or other forage crops, is there a real need to keep molybdenum applications at the minimum.

Little work has been done to compare the effects of carriers of molybdenum on crops. Sodium molybdate and ammonium molybdate are water-soluble and easy to apply in solution form. Molybdic oxide is not soluble in water and must be applied in mixed fertilizers. In general, molybdic oxide and the molybdates give equally satisfactory results, but some research workers believe the soluble salts give quicker responses. Molybdenum disulfide, the insoluble and inert mineral of most molybdenum ores, is not satisfactory for agricultural use. Responses are very slow, and fairly large quantities of the sulfide are required.

On some soils relatively high rates of treatment with molybdenum are required. This probably results from interference by manganese, sulfate or other ions or, under highly acid conditions, from strong fixation. On such soils it may be desirable to supply molybdenum in the form of a complex to protect the molybdenum against competition from other ions and against strong adsorption by the clay particles in the soil.

Putting Molybdenum into Products

WHERE field tests show that molybdenum is needed, it can be applied by the farmer in four types of products:

1. Mixed fertilizers
2. Chemical sprays and dusts
3. Treated seed
4. Bacterial inoculants

Most of the molybdenum used overseas has been incorporated in superphosphate. The usual content is about two pounds sodium molybdate or molybdic oxide in each long ton of product. This small amount can be mixed mechanically into the granulated superphosphate, but the distribution within the mixture is often uneven. Much better mixing is obtained by dissolving the molybdenum compound in the sulfuric acid that is used to treat the crude phosphate rock. This procedure, however, requires segregation of the molybdenized superphosphate through later processing and inventory.

The best compromise between thorough mixing for the user and simplicity for the producer is obtained by spraying small quantities of a concentrated solution of sodium molybdate on the dry fertilizer as it moves along a conveyor belt to the bagger. This method requires no segregation of the product until the last stage of production. It introduces very little water into the product, and the same equipment can be used to incorporate other trace elements as well.

Molybdenum can also be introduced into mixed fertilizers by these general methods. For general-purpose fertilizers the local fertilizer mixer is in the best position to add the required molybdenum. On the other hand, branded and packaged fertilizers for specialty crops such as roses will probably be most conveniently treated at the point of original manufacture.

Experience with molybdenum treatment of seed has been limited thus far to a few experimental and commercial plantings of legumes. The seed is sometimes soaked in a solution of sodium molybdate, but in hot climates premature germination is troublesome. Dusting the salt on the seed eliminates this difficulty. Legume seed can also be treated economically by incorporating the necessary molybdenum in the bacterial inoculant.

Small seeds, such as those of alfalfa and the clovers, contain very little molybdenum, and accordingly these crops are most likely to require added molybdenum. When large seeds, such as those of peas and beans, are produced on a soil with an adequate supply of available molybdenum, they usually contain enough molybdenum to carry the crop through its growth cycle. On the other hand, if these same seeds are produced on marginal soils, they may not contain enough molybdenum to meet the requirements of the crop. Severe crop losses have been caused by planting such deficient seed in molybdenum-deficient soils.

Little work has been done on the application of molybdenum in such agricultural chemicals as insecticides, herbicides, or defoliants. But experience in Florida shows that application in insecticidal sprays is unusually effective and cheap. Where soils fix molybdenum strongly in an unavailable form, direct application to the leaf may be more satisfactory than application to the soil. The possibility of substituting foliar applications of molybdenum for liming the soil may be especially attractive in sprays for ornamental plants.

Looking Ahead

THE use of molybdenum in agriculture has already passed the early research stage and is now entering a period of large-scale development. Research has shown that molybdenum plays several fundamental roles in plant nutrition. Field studies have revealed something of the soil factors causing molybdenum deficiency, and of the relationship between liming the soil and the availability of molybdenum. In actual farming practice, over a million acres have already been treated, and applications of molybdenum are now made to more than thirty commercial crops.

The principal uncertainty today is the extent of molybdenum deficiency on presently unproductive soils of potential agricultural importance. Field and pot trials on such soils are now in progress in a number of countries abroad, and in some twenty states in the United States.

The factors with which molybdenum deficiency is associated are widespread. In the United States, the areas most likely to lack molybdenum are the acid-soil regions east of the Great Plains — especially the highly leached sandy soils of the Atlantic and Gulf coastal plains — and the Pacific Northwest. All the known crop responses in the United States have been obtained in these sections. However, the alkaline soils of the Great Plains, the Intermountain Basin, and the Pacific Southwest need further study before the possibility of molybdenum deficiency can be ruled out in these areas.

Molybdenum deficiencies have also been observed in Canada and Central America; in England, Ireland, France, and the Netherlands; throughout Australia and New Zealand; in

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N.A.C.

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Hercules Powder Co.
President, NAC

WILLIAM ALLEN
Dow Chemical Co.
Vice President, NAC

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MEMBERS of the National Agricultural Chemicals Association return to the Essex & Sussex in Spring Lake, N. J., September 8, 9 and 10, for the 21st annual meeting of the organization. In view of the recent enactment into law of the Miller Bill by Congress, the convention will feature a panel discussion on how the industry will have to operate under this new legislation.

Participants in the panel will include William W. Goodrich, Asst. Gen. Counsel, Food & Drug Division, Dept. of Health, Education & Welfare, Washington, John T. Coyne, Asst. Head, Pesticide Regulation Section, Plant Pest Control Branch, Agr. Research Service, USDA, John D. Conner, NAC Counsel, and Joseph A. Noone, NAC technical advisor.

Richard Yates of Hercules Powder Co., Wilmington, serves as chairman of the program committee. Full details of the program follow:

WEDNESDAY

WHERE WE STAND TODAY . . . . AND TOMORROW

NAC President Paul Mayfield, Presiding

10:10 A.M.
Executive Secretary's Report
L. S. Hitchner, Washington, D. C.

10:30 A.M.
NAC Membership . . . Your Investment In Progress
Paul Mayfield, General Manager, Naval Stores Department
Hercules Powder Company, Wilmington

11:00 A.M.
Relationship of Pesticides to Health
David E. Price, M.D., Asst. Surgeon Gen.
Public Health Service, Department of Health, Education and Welfare, Washington, D. C.

11:40 A.M.
Telling Your Story
Frank H. Jeter, Ph.D., Director
Division of Information, School of Agriculture, North Carolina State College, Raleigh, North Carolina

6:30 P.M.
Reception for Members and Guests

8:00 P.M.
Board of Directors Meeting

holds 21st Annual Meeting at Spring Lake, N. J.

THURSDAY

HOW TO OPERATE UNDER THE MILLER PESTICIDE RESIDUE AMENDMENT

L. S. Hitchner, Presiding

10:00 A. M.
Panel Discussion
William W. Goodrich, Asst. General Counsel, Food & Drug Division, Department of Health, Education & Welfare, Washington, D. C.
John T. Coyne, Assistant Head, Pesticide Regulation Section, Plant Pest Control Branch, Agricultural Research Service, U.S. Department of Agricultural
John D. Conner
NAC Counsel
Joseph A. Noone
NAC Technical Adviser

Golf Tournament

7:00 P.M.
Annual Banquet

FRIDAY

UP-TO-DATE INFORMATION FOR THE SUCCESS OF THE INDUSTRY

W. W. Allen, Presiding
Manager, Agricultural Chemical Sales, The Dow Chemical Co., Midland, Mich.

10:00 A. M.
Non-Pharmaceutical Uses of Antibiotics
William R. Jester, Assistant Director Division of Antibiotics, Food & Drug Administration, Department of Health Education & Welfare, Washington, D. C.

10:20 A. M.
Some Results With Antibiotics In Plant Disease Control
John C. Dunegan, Principal Pathologist, Agricultural Research Service, U. S. Department of Agriculture
Beltsville, Maryland

10:40 A. M.
Sales Personnel Training Program
W. R. Dixon, Asst. General Sales Mgr., The Dow Chemical Co., Midland, Mich.

11:10 A. M.
Youth . . . Your Customer Today and Tomorrow
K. H. Anderson, Associate Director National Committee on Boys and Girls Club Work, Inc. Chicago, Illinois

11:40 A. M.
What Do You Know About Your No. 1 Customer — The Farmer?
E. H. Fallon, Assistant Gen. Manager, Cooperative G.L.F. Exchange, Inc. Ithaca, N. Y.

On Left Hand Page:
CONVENTION SPEAKERS

Far left: David E. Price, Asst. Surgeon General "Relationship of Pesticides to Health"

Center: Frank H. Jeter, N. Carolina State College "Telling Your Story"

Right: John C. Dunegan, Agr. Research Service, USDA "Some Results with Antibiotics in Plant Disease Control"

Panel Members who will discuss how to operate under the Miller Pesticide Residue Amendment

Top: Wm. W. Goodrich, Dept. Health, Education & Welfare

2nd: John T. Coyne, Agr. Research Service, USDA

3rd: John D. Conner, NAC Counsel

Bottom: Joseph A. Noone, NAC Technical Advisor

Hold 5th Annual Pacific Northwest Fertilizer Conference

A PROGRAM concentrating on improving fertilizer application and use, evidenced by practical reasearch and applied testing, highlighted the fifth annual Pacific Northwest Regional Fertilizer Conference, held at the Willard Hotel, Klamath Falls, Oregon, July 20-22nd. Some 200 visitors attended the conference, which is sponsored by the Soil Improvement Committee of the Pacific Northwest Plant Food Association. Boise, Idaho has been selected as the site for the conference in 1955, with the exact dates to be set later.

E. Hanson, president of the association, addressed the membership on the first day of the three-day meeting, and opened the technical discussions.

Guest speaker, W. H. Garman, American Plant Food Council, Washington, D. C., discussed "Our Future and Agricultural Research," indicating that addition of correct amounts of necessary plant nutrients to soils is the major key to efficient farming, and that on the question of critical research needs, studies in soil physics and microbiology are most important, followed by research in plant and animal diseases.

The "Principles and Practices of Plant Analysis in Crop Fertilization" were discussed by Albert Ulrich University of California, Berkeley, Calif., who reported that plant analysis, when correctly developed and applied, can be of help in determining the kinds of fertilizers to apply to crops, the amounts of fertilizers necessary and the time when they should be added to produce the maximum effect on crop growth. Along this line, Mr. Ulrich indicated that in the program for sugar beets more sugar per acre may be produced by the grower by harvesting the nitrogen deficient fields first, delaying the other fields until they too become deficient, . . . the basis for this program being that beets deficient in nitrogen tend to be higher in sugar content than non-deficient beets.

A. R. Halvorson, Klamath Experimental Area, discussed fertility problems of the Klamath Basin, and indicated that exploratory work on the Klamath Basin soils has shown that sulfur and nitrogen are needed on dryland areas; that nitrogen is needed on irrigated mineral soils; also phosphorus under intensive cropping.

He reported that potash has given no conclusive evidence of producing yield increases, although soil tests in some places indicate that potash may soon be needed. The alkaline muck soils need phosphorus, copper, manganese and zinc, and in some cases, nitrogen; while the acid muck soils are quite deficient in phosphorus. Where soils extend up into the summer pasture area of Fort Klamath, a complete fertilizer is essential for maximum production.

Nutrient Response

A report on the "Potash Response on Pears in the Medford Area" by George A. Wickstrom and Grant H. Braun, American Potash Institute, showed that in general, trees with leaf contents below 0.45% K developed the typical scorched leaf of potassium deficiency. On two of the orchards where such condition prevailed, fertilizer plots were established in 1951. Sulfate of potash was applied at rates of 25, 50 and 100 pounds per tree. The potassium content of K-treated trees, increased an average of 96% in the period 1951 to 1953. Response to potash was reflected in improvement in color of the leaves, vigor of the trees, and the size and condition of the fruit.

Control of blossom blast or twig dieback in pears was reported by D. F. Allmendinger, Folke Johnson and V. L. Miller, Western Washington Experiment Station, Puyallup, Wash., who recommended a spray of boron after harvest. They indicated that the disorder is almost completely controlled by a spray of one or two pounds of sodium pentaborate or three pounds of borax per 100 gallons of water applied immediately after harvest. Sprays applied in June were not as successful as were the fall sprays.

Results of a survey of the nutrient status of potatoes in northwestern Washington were presented by H. A. Kittams and W. P. Mortensen, Western Washington Experiment Station, Puyallup, Wash., who indicated that nitrogen was inadequate in 20 per cent of the samples and appears to be associated with an insufficient fertilizer application. Phosphorus was most frequently in short supply, particularly for the upland soils. Potassium was low in about 40 per cent of the samples of upland depression group of soils, but was low for only a few samples of other soil groups. Except for groups of fields managed by the same grower, there was generally little relation between yield and applied fertilizer or concentrations of nutrients in either the soil or the plant. The poor correlations between yield and nutrient concentrations, he said, are probably due to inadequate yield measurements, differences in management, and the fact that the nutrient concentrations were above critical levels in most cases.

The role of calcium and sulfur as plant nutrients was discussed by J. C. Rinehart, U. S. Gypsum Co., Chicago. Mr. Rinehart reported that

there is no doubt of the importance of sulfur as a constituent of protein and other important organic compounds. Sulfur undoubtedly is needed in considerable quantities in a number of soils in the United States, and in some rural regions. Any permanent fertilizer system that does not include application of a sulfur-bearing material, he cautioned, is certain to result in sulfur-deficient crops.

Gypsum, he said, has no acid-neutralizing effects, but is a source of quickly available calcium. The question of whether calcium deficiency or soil acidity is responsible for poor plant growth was briefly reviewed.

Because of the essentiality to plants of calcium and sulfur, advocates of the use of concentrated phosphates instead of normal superphosphate should consider the use of a supplementary source of these elements, he suggested.

Fertilizer Testing Programs

AN address by G. K. Baghott, farm advisor, Tulelake, California, on fertility research on grain indicated that excessive nitrogen fertilization may cause increased lodging, high protein, low extract, low kernel weight, at very little increase in yield. Tests on seeding rates, he said, have indicated that between 75-100 pounds per acre appears to produce the highest quality malting barley. Rates of over 100 pounds per acre may tend to reduce kernel weight, raise protein values, and lower extract at no increase in yield. Rates as low as 47 pounds per acre have produced high yields under ideal conditions, with high kernel weight, and low protein value and high extract value. Tests have shown that lower seeding rates will produce larger kernels, stronger tillering of the plants resulting in higher quality barley than where seeding rates over 100 pounds per acre were used.

Soil Testing Programs

L. A. Alban, Soil Testing Laboratory, Oregon State College, Corvallis, Ore., discussed the subject of "Where We Stand in Soil Testing." He reported that "The soil testing service for research personnel can be used (1) where preliminary soil tests are necessary from a number of areas in order to pick out favorable experimental sites. (2) where a fertility survey is conducted in an area either for the purpose of obtaining information regarding specific soil types or for information concerning all soils on which a specific crop is grown, (3) where routine soil testing is desired on soil samples taken from experimental plots to measure fertilizer response and to aid in the calibration of soil tests."

In outlining the Idaho soil testing program, Charles Painter and G. Orien Baker, Univ. of Idaho, Moscow, Ida., indicated that soil testing in the northern part of the state is not satisfactory and that additional basic information is necessary before a good correlation can be obtained between soil tests and field response.

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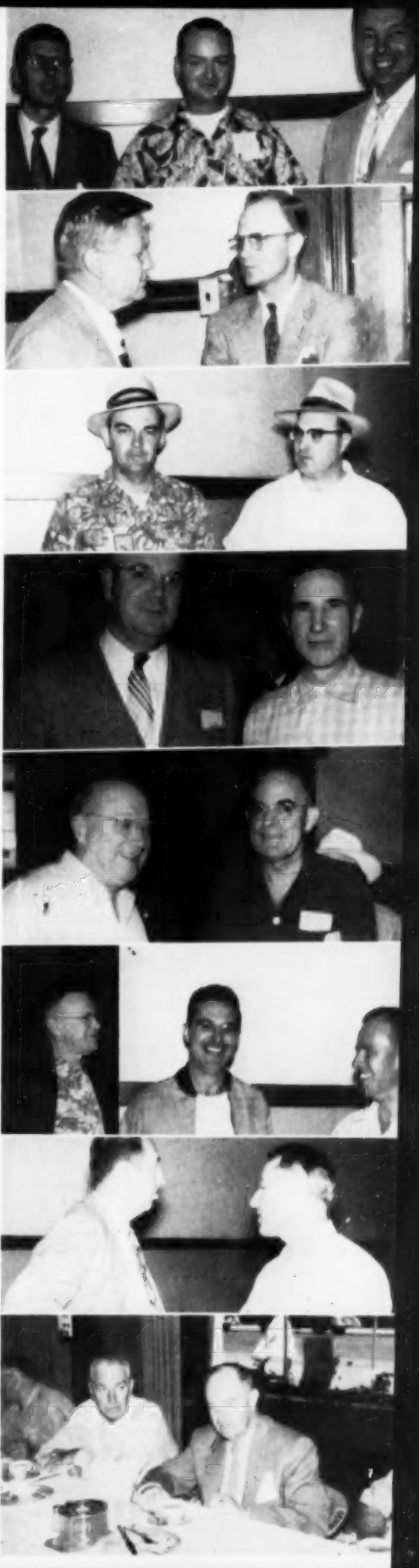


Photos, from top to bottom, and left to right:

R. Allard, Wilbur Ellis & Co., Fresno, Cal.; E. Ashill, Marine By Products Co., Portland, Ore.; G. Kokko, Wilbur Ellis & Co., Salem, Ore.

E. W. Hansen, N'land Industries, Leurston, Ida., and president of the N. W. Plant Food Assn.; A. R. Halvorson, Klamath Falls Experimental Area, and chairman of the conference.

D. Graham, U. S. Gypsum Co., Seattle, Wash., J. C. Rinehart, U. S. Gypsum Co., Chicago, Ill.

Robert Finch, Swift & Co., North Portland, Ore.; Arthur Cole, State Feed Inspector, Salem, Ore.

W. Martin, Univ. of Calif., Davis, Calif.; Earle Shaw, Chilean Nitrate Sales Co., Los Angeles.

Leon S. Jackson, secretary, Pacific Northwest Plant Food Assn.; Jack McConkey, Chas. H. Lilly Co., Seattle, Wash.; A. E. McDonald, Consolidated Mining & Smelting Co., Vancouver, B. C.

M. T. Folsom, Shell Chemical Co., San Francisco; L. Fryer, Chas. H. Lilly Co., Seattle.

M. E. McAllam, American Potash Inst., Los Angeles; Elmo Stevenson, Southern Oregon College of Education.

W. H. MARTIN
Director

A Visit to the

THE phenomenal expansion of the agricultural chemicals industry in the past fifty years has posed much more complex questions on chemical and fertilizer applications than were considered 80 years ago by New Jersey scientists, when agricultural research began at Rutgers University, New Brunswick, N. J.

The introduction of new chemicals and more efficient farming methods required closer relationships between the farmer and manufacturer . . . thus the need for an agricultural station to investigate new methods, new compounds, and farmer requirements. New Jersey, incidentally, was the third state to establish an agricultural experiment station, which it did in 1880. However, farm research at Rutgers dates back at least to 1864, when the legislature in accepting for New Jersey the benefits of the Land Grant College Act, required the trustees to "furnish and provide a suitable tract of land, conveniently located for an experimental farm." The original farm of 98 acres on the outskirts of New Brunswick has now grown to a 900-acre campus of the College of Agriculture, where the Experiment Station is located.

In all, the New Jersey Experiment Station includes more than twenty departments, which are coordinated by Dr. William H. Martin, who has been director of the station since 1939. He is also dean of the College of Agriculture and director of the New Jersey Extension Service.

From the beginning, the New Jersey station has won international recognition for its contributions to agricultural science. Here was pioneered the investigation of the influence of bacteria, fungi and other microscopic organisms on the soil. Breeding work has produced improved varieties of peaches, tomatoes, etc. Dr. Firman E. Bear, who was head of the Soils Department from 1940 until his retirement this year, had given impetus to the work done with trace elements, such as boron, manganese, iron, magnesium, zinc, and others in plant nutrition. Soil scientists are following with experiments on boron and other elements in relation to crop production.

Still other projects currently underway in the soils department include studies on: available nutrient supply of N.J. soils with respect to total nutrient requirements of various crops and to crop variations in ability to extract nutrients from the soil; use of soil and plant analyses as means of diagnosing soil deficiencies and plant needs; development and maintenance of improved soil structure, etc.,

Dr. S. J. Toth, associate professor of soils, has in the past four years directed a study on soil conditioners and points out that one advantage of conditioners on all soils may lie in possible rejuvenation of the soil, eliminating the necessity for practicing crop rotation, planting forage crops periodically, etc. Some 8-10 products are being evaluated on the basis of the effect on yield, and secondarily with respect to the longevity of aggregates under standard systems of farming practice.

Dinitros in Pre-emergence Treatments

THE farm crops division, headed by Gilbert H. Ahlgren, is currently studying some 30 projects including investigations on plant response to herbicides, chemicals in soil sterilization, weed control, etc. Dr. Richard J. Aldrich, who is assigned to the Station by the USDA, points out that the discovery of the value of 2,4-D as a pre-emergence chemical in corn was made some eight years ago by D. E. Wolf and J. Anderson during their investigations at the Station. Further applications of 2,4-D and use of other chemicals on various crops are among the projects under continued study. It is reported that use of dinitros

as contact materials in the control of chickweed (*Stellaria media*) in hay legumes, such as alfalfa, has worked satisfactorily. Good control is obtained with early application (when the chickweed is still upright) of 1 lb. dinitro per acre; if application is not made early and the chickweed becomes heavily matted, one application is not adequate, and two treatments of 1 lb. per acre may be necessary to give control. The time of application is a critical factor in obtaining optimum results. The treatment is still under field study, but being used commercially to some extent this year.

In connection with this investigation, it is pointed out that chloro IPC gives good results in control of chickweed regardless of time of application. Its use is limited, however, because of its toxicity to grasses.

The analysis of the value of chemical weed control in potatoes, using the dinitros in pre-emergence treatment showed an increase in yield of potatoes over the check in three years of testing.

Other tests with dinitros are directed to use on sweet corn and field corn; current experiments are on a field scale, with limited commercial application. Dosage recommendations specify 4½ lbs./acre as pre-emergence application, or 1½-2 lbs./acre just at come-up for the same weed control. As in the chickweed tests, the time of application is an important factor in effective weed control.

Much work is currently being done on the response of legumes to various phenoxy compounds: 3,4-D, 2,4-D and MCP are applied to oats underseeded with different legumes and to pure stands of legumes. Tests show that the legumes vary in tolerance, but studies are at too early a stage for conclusive statements.

In the investigation of the effect of sodium 2,4-dichlorophenoxyethyl sulfate (SES) on the growth and yield of strawberries, it was found that yields were not reduced by rates of SES necessary to control weeds providing the chemical was not in the soil during early rooting of parent or runner plants. Further study of weed control with these chemicals in other crops is still in progress.

Flavor Evaluations

AN important consideration throughout the investigation of chemicals for weed control, insect and disease control, fertilization, etc., is the effect, if any, of the chemicals used on the flavor of edible crops. Thus when chemicals are in the advanced stages of trial and testing, the resulting food crop is directed to the food technology department for evaluation of effect on flavor. W. A. MacLinn, head of the food technology department, indicates that one factor to be weighed in the determination of "off" flavor is the extent to which a difference in flavor might be allowed in regular use of a product, and where the line of acceptance is to be drawn.

Quality control men from commercial firms work with the food technology department in judging flavors. Reproducibility of the tests is calculated from the number of times the "tasting panel" is able to reproduce its findings on two replicated tastings of a series of samples. One specific project under current investigation is the testing of asparagus for off flavor due to treatments.

Soil Fertilizer Requirements

IN experiments concerned with fertilizer requirements of various crops, attention is directed to the high amount of potassium required for the perennial legumes in New Jersey soils. Whereas recommendations of 25-30 years ago centered around an 0-2-1 for alfalfa, this ratio changed later to 0-1-1, and in the past two years the recommendation has been 0-1-2. It is anticipated that this ratio may even change to 0-1-3 or 0-1-4. Better persistance and

higher yields are obtained with the greater applications of potash.

In view of the different response of various forage crops to fertilizers, studies at the Station seem to indicate that future fertilizer recommendation will tend toward more specific mixtures for each forage crop. Although it is hardly expected that the farmer will be required to make-up his own specific fertilizer mixtures, it is conceivable that suppliers and dealers will need to carry a larger selection of mixed fertilizers.

Fertility requirements are being investigated also from the standpoint of relation to planting patterns. J. Collier and C. C. Stults are directing their attention to this project and advise that the higher the fertility level (with available moisture), the higher the planting rate the soil will support, the higher will be the yield. Best results to date are a planting rate of 14-16,000 plants per acre.

Pasture Renovation

THE substitution of chemicals for tillage in pasture renovation has been under consideration by M. A. Sprague, who reports that the application of sodium trichloroacetate (TCA) at low rates per acre to kill old grazed Kentucky bluegrass sods facilitates seedbed preparation with much less tillage and reduced competition during the period of seedling establishment. Some two diskings of a sod treated with TCA were required in the tests at the Station, as compared with 10-12 diskings of a seedbed prepared in the conventional manner. In the past year, good results have been obtained in the use of Dalapon at rates of 2-3 lbs. per acre.

Still another line of study in the treatment of grasses is contained in the use of monoethanolamine arsenite to stunt the growth of grasses and get the benefit of mulching. Ammoniacal arsenite, containing 25% nitrogen, is also used in the treatments.

Plant Pathology Research

WITH the influx of late blight in New Jersey, in 1946, an intensive program of screening chemicals by B. H. Davis to control this disease resulted in a recommendation of an alternate schedule treatment of copper compounds and zerlate (Ziram). Zineb is recommended for use on cucumbers and cantaloupe.

Studies by R. H. Daines in fruit and vegetable research, resulted in the recommendation of Captan for disease control on apples, at a low cost and providing a good "finish" on the fruit.

E. H. Varney, who is assigned to the New Jersey Station by the USDA, is directing research on developing spray programs which will result in good yields on cranberries and blueberries. Basic studies on virus diseases of pepper have resulted in the introduction of new varieties by C. M. Haenseler, while potato research and publication of the *American Potato Journal* is under the direction of J. C. Campbell. Still other projects in fruit and vegetable research deal with disease control by breeding, investigations of the fungicidal value of various chemicals, and studies of injury by phytotoxic gases and industrial residues.

Fungicidal control of diseases of turf, and ornamentals are specific interests of studies directed by S. H. Davis, Jr., who recently acted as coordinator of the national fungicide trials on turf.

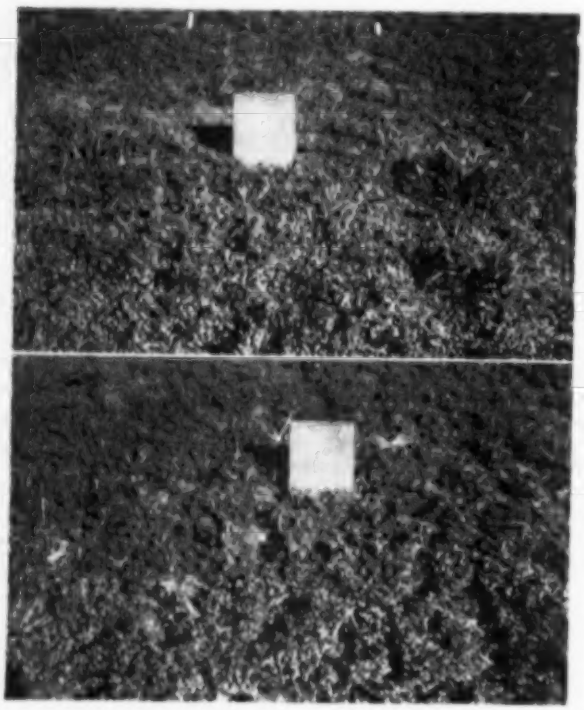
Plant diseases and virus research have always been of strong interest at the New Jersey Station, which has the distinction of having employed the first full time ornamental plant pathologist, R. P. White, who is now the executive secretary of the American Nurseryman's Association.

Entomological Project

BAILEY B. Pepper, of the entomology department, calls attention to the many acres of land salvaged from mosquitoes for agricultural use, first by water management, then by chemical development, residual insecticides, and further water management. Some 100,000 acres of salt marsh have thus been made available for agricultural use.

Reviewing the entomological projects at the New Jersey Station, Dr. Pepper outlines some of the studies currently underway, including studies of fruit insects; efficiency and host tolerance of new insecticides, spreaders and stickers; soil infesting insect investigations; truck and garden

(*Continued on Page 133*)



Top left: check plot showing chickweed infestation in alfalfa.

Bottom left: alfalfa treated at 1 lb of dinitro-o-sec butyl phenol (equivalent) in 10 gallons of water per acre.

Fertilizer, Pesticide Talks Scheduled for A.C.S.

National Meeting in New York Sept. 12-17

FERTILIZER and pesticide technical men from all parts of the country will converge on New York this month to take part in the 126th National Meeting of the American Chemical Society, Sept. 12-17, at the Hotel Statler and other official hotels.

According to the advance program, pesticide talks will be concerned with tropical use of insecticides, new materials, toxicity data and other topics.

The fertilizer men will be concerned with reports on surfactants, problems with phosphates and superphosphate, soil testing and minor elements.

Following are some of the more pertinent abstracts of papers to be presented in the Division of Agricultural and Food Chemistry.

Factors Influencing the Demand for Pesticides in Tropical Agriculture. *Edson J. Hambelton, Plant Pest Control Branch, Agricultural Research Service, U. S. Department of Agriculture, Washington, D. C.*

The development of many new and effective pesticides since World War II has stimulated interest in safer and better methods of their application. With the gradual improvement of the world's agriculture in highly populated areas in the Tropics and elsewhere, has come increased interest in the factors affecting the demand for chemical products abroad.

The farmer's ability to purchase and use pesticides is related not only to his standard of living and farm practices, but to his customs, religion, and superstitions. Poor health and living conditions and insufficient education and services provided by farm organizations prevent hundreds of thousands of farmers from learning how to protect their crops and livestock against insects and diseases.

International organizations, the pesticide industry, and technical-assistance programs are doing much to create interest in the wider use of pesticides abroad. The training of nationals and the closer cooperation among government, industry, and farmers are contributing toward a better food supply and economic stability. Through the well-planned application of chemical products abroad, we can look forward to an increasing demand for them while progress is being made in all tropical agriculture.

Spectrophotometric Analysis of Technical Chlordan and Technical Heptachlor Residues on Food and Forage Crops. *Eugene P. Ordas, Victor C. Smith, and Charles F. Meyer, Velsicol Corp., Research Laboratories, Chicago, Ill.*

The need for accurate methods for the specific analysis of micro quantities of chlordan or heptachlor possibly present on food and forage crops has led to the adoption of the two methods: the Davidow method for chlordan residues and the Polen-Silverman method for heptachlor residue. Modification of the reagents, solvents, equipment and clean-up techniques have made it possible to detect chlordan at 0.02 p.p.m. and heptachlor at 0.01 p.p.m. in samples ranging from 500 to 2200 grams in size.

Samples are ground and dried with anhydrous sodium sulfate and extracted in Soxhlet extractors with a purified n-pentane. Plant pigments, oils, and waxes are separated by one of several techniques of chromatography, and the residue of the extract reacted with the color complex forming reagent. The toxicant concentration is determined by spectrophotometric measurement of the intensity of the color complex and by comparison of this intensity to the toxicant concentration taken from a standard calibration curve. Techniques to analyze 35 different crops have been developed and recovery and residue data are presented.

The method has been used to provide toxicant persistence data in various media including crops and soil. The quantity of toxicant residue has been shown to be a function of the rate of application, and the time between application and harvest.

The Rate of Accumulation of DDT in Soils from Spray Practices. *Joseph M. Ginsburg, New Jersey Agricultural Experiment Station, Rutgers University, New Brunswick, N. J.*

As a result of the wide use of DDT for the control of various insect pests, there has been a growing concern over its possible accumulation in soils in sufficiently large quantities to become harmful to the growth of certain crops.

Chemical analyses of DDT in many soils from different crops, reported in this paper, indicate considerable variations in the rate of DDT accumulation. The total deposits of DDT in agricultural soils from spray practices will depend on the following factors: type of crop grown; DDT formulations employed; number of sprays or dusts applied per season; methods of application; amount of DDT applied per acre of crop; cultivation practices; soil topography; climatic factors and others.

The possibility of accumulating large quantities of DDT in soils from spray residues appears more likely to occur in orchards, especially in apple orchards where from 25 to 40 pounds of actual DDT may be applied per acre each season, than in soils from field crops such as corn, or from vegetable crops such as potatoes. In general, the rate of DDT disappearance from soils is comparatively slow, lasting for a number of years.

An Organic Phosphorus Compound Highly Toxic to Insects. *Arnold M. Mattson, Janet T. Spillane, and George W. Pearce, Communicable Disease Center, Public Health Service, Savannah, Ga.*

In the course of screening various organic phosphorus compounds for their vapor toxicity to house flies, a highly potent impurity was found present in one of the products. Since the toxic impurity occurred only to the extent of about 0.05 to 0.10% isolation of sufficient quantities for analysis and identification proved difficult. However, enough was isolated for micro analysis. The results indicated that the impurity was closely related to the product in which it was found. Subsequent work provided a simple method of converting the mother product to a highly toxic compound evidently identical to the impurity originally found in it. Evidence based on phosphorus, chlorine, molecular weight, and other analyses indicates that the potent compound is 0,0-dimethyl-2,2- dichloroethenolphosphonate. Its toxicity towards house flies is about equivalent to parathion but it appears to be substantially less toxic to rats when treated orally.

The potential uses of the compound, especially in fly control, are being investigated.

(*Turn to Page* 132)

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NITROGEN...

a study of U. S. productive capacity

IN the face of the phenomenal expansion in U. S. production of nitrogen over the past five years, and the continuance of this expansion, particularly in plant capacity for production of anhydrous ammonia, many followers of the fertilizer chemical market have been asking the obvious questions over recent months. Are we overproducing nitrogen. Can the country absorb the vast new production of anhydrous ammonia? Is the chemical industry, with anhydrous ammonia, duplicating its performance with DDT and BHC? How long can we keep expanding output before anhydrous ammonia, and as a matter of fact nitrogen in all forms, will be coming out our ears?

Data and informed opinion suggesting the answers to some of these questions are contained in a comprehensive and up-to-the-minute report, "Statistical Summary of U. S. Nitrogen Production," just issued by H. J. Baker & Bro., New York. The basic facts of nitrogen production over recent years are somewhat as follows. Production for the year 1951 was approximately 2,212,000 tons of N. On the basis of first quarter 1954 figures, production for the current year will reach almost 3,000,000 tons of N. The increase, over a three year period, will approximate thirty-five percent.

Consumption of nitrogen materials by direct application has shown an increase of even more impressive proportions, percentagewise, than has the figure for total nitrogen consumption. During the 1949-1950 crop year, 435,000 tons of N were used in the United States for direct application. By the 1952-53 season

U. S. nitrogen plants — other than by-products — in place, under construction and proposed indicating capacity of each in tons of ammonia and totals in tons of pure N.

	Rated Capacity Tons NH_3 per Year				
	Present	Under Const.	Proposed	Total	Total Ton N. Pr. Yr.
WEST COAST					
Hooker Electrochemical Tacoma, Wash.	22,000			22,000	18,000
Hercules Powder Co. Pinole, Calif.	50,000			50,000	41,000
Shell Chemical Co. Shell Point, Calif.	109,500			109,500	90,000
Ventura, Calif.	65,000			65,000	53,000
Dow Chemical Pittsburgh, Calif.	7,320			7,320	6,000
Brea Chemicals Brea, Calif.	86,000			86,000	70,000
Columbia River Chem. Pasco, Wash.			53,500	53,500	52,000
Utah Chemical Co. Mount Pleasant, Utah			94,000	94,000	77,000
Shell Chemical Corp. Pittsburgh, Calif.					75,000
Ammonia Chem. Corp. Oleander, Calif.					25,000
MIDCONTINENT AND SOUTH					
Allied Chem & Dye Corp. La Platte, Neb..	75,640			75,640	62,000
Coop Farm Chemicals Lawrence, Kansas		63,440		63,440	52,000
Spencer Chemical Pittsburg, Kans.	178,000			178,000	45,000
Henderson, Ky.	79,000			79,000	65,000
Vicksburgh, Miss.	72,000			72,000	59,000
Phillips Chemical Co. Etter, Tex.	154,000			154,000	126,000
Port Adams, Tex.	156,160			156,160	128,000
Missouri Ordnance Wks. Louisiana, Mo.	42,000			42,000	34,400

	Rated Capacity Tons NH_3 per Year				
	Present	Under Const.	Proposed	Total	Total Ton N. Pr. Yr.
Deere & Co.					
Pryor, Okla.		65,880		65,880	54,000
Grace Chemical					
Memphis, Tenn.		87,840		87,840	72,000
TVA, Muscle Shoals, Ala.	91,500			91,500	74,000
Ala. By-Products &					
Hercules, Powder			45,000	45,000	38,900
Tarrant, Ala.					
Lion Oil Co.					
El Dorado, Ark.	207,400			207,400	170,000
Luling, La.	107,360			107,360	88,000
Miss. Chemical Co.					
Yazoo City, Miss.	43,600	22,400		66,000	54,000
Comm. Solvents					
Sterlington, La.	135,000			135,000	110,000
Dow Chemical Co.					
Freeport, Tex.	35,380		35,380	70,760	58,000
Midland, Mich.	Unrevealed				
Mathieson Chemical					
Lake Charles, La.	69,000	34,000		103,000	84,000
San Jacinto Chemical					
Houston, Tex.	27,000	10,000		37,000	30,300
American Cyanamid Co.					
New Orleans, La.		109,000		109,000	90,000
Penn. Salt Mfg. Co.					
Wyandotte, Mich.	31,350			31,350	26,000
Allied Chemical & Dye					
South Point, Ohio	285,480			285,480	234,000
Nat'l Distillers					
Tuscola, Ill		50,000		50,000	41,000
Miss. River Fuel Corp.					
Crystal City, Ill.			66,000	66,000	54,000
Midland Ammonia Co.					
Midland, Mich.					20,000
Ala. By-Products					
Birmingham, Ala.					37,000
Atlas Powder Co.					
Atlas, Mo.					——
Lange Bros.					
St. Louis, Mo.					——
Mexico, Mo.					——
Gulf Improvement Corp.					
Pascagoula, Miss.					——
EAST COAST					
Dupont Company					
Niagara Falls, N. Y.	9,800			9,800	8,000
Belle, W. Va.	231,800			231,800	190,000
Mathieson Chemical					
Niagara Falls, N. Y.	6,100			6,100	5,000
Morgantown, W. V.	188,000			188,000	154,000
Allied Chemical & Dye					
Hopewell, Va.	350,000		50,000	400,000	328,000

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this total had almost doubled, the figure for the latter season standing at 804,000 tons of N. Anhydrous ammonia, which was used only in relatively small quantity prior to the 1951-52 season, registered the impressive total that year of 137,000 tons of N, and the following season consumption in this form had increased to 178,000 tons of N. It has now just recently been reported by the Anhydrous Ammonia Institute that ammonia sales for direct application increased nearly 34% during the first 5 months of 1954 as compared with the same period in 1953.

One table in the Baker report summarizes the country's capacity for nitrogen production, present and future. Existing plants are listed having rated capacity of approximately three million tons of NH_3 per year. To this total must be added plants under construction having an estimated capacity of an additional 596,000 tons, and proposed plants which when built will add an additional 278,000 tons to the total.

In the face of this tremendous increase in productive capacity, and the continuing new plant construction, the Baker report still strikes a note of firm optimism as to the future of the nitrogen industry. Offering an answer to the question of whether or not American agriculture can continue to absorb the ever increasing production of nitrogen, they suggest that the future is still essentially sound because of a number of consumption factors.

First, it is pointed out that in the older farming countries of Europe consumption of nitrogen commonly runs from five to twenty times the rate per acre of nitrogen consumption in the U. S. Figures of the U. S. Department of Agriculture are cited to the effect that less than one third of the total crop land in the United States receives any nitrogen-bearing fertilizer. Finally it is noted that it would be possible on American farm land to increase the per acre efficiency, per dollar of investment both in land, materials and labor, if nitrogen were used at over

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Production of Nitrogen Compounds in the U. S.
In Tons of Material and Tons of Pure N.

	1951		1952		1953		1954**	
	Tons Material	Tons N.	Tons Material	Tons N.	Tons Material	Tons N.	Tons Material	Tons N.
Anhy. Am. 82% N.	1,777,074	1,456,201	2,052,114	1,682,733	2,286,454	1,874,892	2,615,460	2,144,677
Am. N. 33% N. Fert. Grd.	1,139,815	376,139	1,258,565	415,326	1,331,136	439,275	1,547,532	510,686
Other	206,628	68,187	208,776	68,896	230,296	75,998		
Total	1,346,443	444,326	1,467,341	484,222	1,561,434	515,273	1,547,532	510,686
Am. Sul. 20.5% N. Syn.	622,084	127,527	812,795	166,623	544,578	111,639	804,780	164,980
*By-Pro.	897,914	184,072	802,412	164,494	960,012	196,802	855,188	175,314
Total	1,519,998	311,599	1,615,207	331,117	1,504,590	308,441	1,659,968	340,294
	4,643,515	2,212,126	5,134,662	2,498,072	5,352,478	2,698,606	5,822,960	2,995,657

*Data from Bureau of Mines
**Projected on basis of 1st quarter figures

Source: Bureau of Census
Prepared by: H. J. Baker & Bro.

Consumption of Nitrogen Materials by Direct Application in the U. S.
In Total Net Tons of Material and Tons of Pure N.

	1949-1950		1950-1951		1951-1952		1952-1953	
	Tons Material	Tons N.	Tons Material	Tons N.	Tons Material	Tons N.	Tons Material	Tons N.
Am. N. 33% N.	577,562	190,596	638,376	210,664	799,189	263,732	846,252	279,263
N. of Soda 16% N.	627,424	100,388	683,967	109,435	681,761	109,082	647,483	103,597
Am. N.-Lime 20.5% N.	*		*		257,517	52,791	419,845	86,068
Am. Sul. 20.5% N.	234,664	48,106	461,601	94,628	486,817	99,797	534,749	111,468
Anhy. Am. 82% N.	*		*		168,273	137,984	217,182	178,089
Cal. Cym. 21% N.	81,578	17,031	64,222	13,487	42,254	8,873	82,219	17,266
Am. Liq. 16%-41% N_2 (1)	*		*		20,026	6,008	72,917	21,875
Cal. N. 15.5% N.	*		*		49,456	7,666	47,980	7,437
Other (ASN-Urea and Unclassified) (1)	264,676	79,403	456,811	137,043	77,631	23,289	118,672	35,602
	1,785,904	435,524	2,304,977	565,257	2,582,924	709,222	2,987,299	804,665

*Included in "Other"
Assume average 30% N. for comparative purposes.
Source: "Commercial Fertilizers — Consumption in the U. S. — 1952-53" by—Scholl, Wallace & Fox, U. S. Department of Agriculture.

Prepared by: H. J. Baker & Bro.

MORE and more businessmen are "following the flag" in search of new markets for their wares. This trend appears to be reaching boom proportions. It is fed by sharp competition for the lush U. S. market, realistic encouragement from many government agencies, and from its own momentum. It is a field engaged in by both large and small companies and organizations—some with huge overseas staffs, others who are entirely new at this venture.

The main goal is the same as it is here at home, that is to serve the needs of people. In this respect, the agricultural chemicals industry would seem to have tremendous potential. For, while only one person in eight lives on a farm in the United States, the ratio jumps to three in every five persons on a world basis. There are considerable differences from continent to continent, however. In North America only one person in five is a farmer or member of his family. In Asia and Africa, seven out of ten live by the land.

Of course there are many other factors to consider which would be a part of any market study, such as the productivity of farmers as a key to their buying power, climatic and soil conditions, crops raised and present and prospective markets. Nonetheless, it is true to say that, hard as it may be for us to realize in the United States, we still live in a world of farmers.

One of the major aims of nearly every world organization is to increase the wealth of the farmers by making it possible for them to produce more. This is conditioned upon intelligence and knowledge. But when it comes to the physical things which increase the farmer's productivity pesticides and fertilizers top the list.

Consequently, it seems inevitable that in the long pull more fertilizers and pesticides are going to be used . . . a whole lot more. This article is going to review some of the developments in this area, leaving it up to the reader to form his own conclusions and to act on any piece of information which seems to merit investigation.

Of immediate interest, it appears that South America will be coming in for more attention by U. S. government agencies operating in the foreign field. At the same time, Europe is slated to receive less. In fact, the Foreign Operations Administration headed by Harold Stassen is engaged in what is termed a "phasing out" in Europe. That is the Agency is placing its operations on a basis where the important aspects can be carried on between various non-government groups in the countries involved. In most instances this means by businessmen.

Plans for South America are still in the formative stage, but agriculture is certainly due to receive primary attention. It is hoped that the lessons learned in Europe will be applied to operations south of the border.

One specific project which is just getting under way is designed to get better information to more farmers in South American countries. This problem is being approached as one that is fundamental to the increased productivity of farmers. Those who are planning this operation have been active in similar work in Europe.

One of the first steps is an invitation from United States to the editors who work with farm papers, farm magazines, or the farm pages of newspapers, plus radio broadcasters who do farm broadcasting, those writing farm radio material, or those in station management interested in developing farm programs. FAO (Food and Agriculture Organization) has issued this invitation to this group to attend work sessions in the United States this fall. While in the U. S. they will meet with their counterparts and have as many shirt sleeve sessions as they wish during their stay of several months duration.

The writer has been priviledged to attend some of these sessions which applied to Europeans and can subscribe to the earnestness with which most of the visitors seek to learn how we do it here. In fact, some of those I have dealt with have dropped more than one plan which surpasses the way we do things here. It's a two way street in many cases. One example of this is the excellent agricultural leaflets put out for farmers by the West Germans. The art work and the text compare very favorably with our publications.

It is visualized that these same kinds of meetings will be held with the South American group. The value of this activity is derived when the guests return home and in their own way and in keeping with their own limitations and objectives improve the agricultural information programs in their respective countries. This makes it possible for more farmers to have reliable information about the developments which have a bearing upon the use of pesticides and fertilizers.

By Don Lerch
Cornwell, Inc.
Washington, D. C.

While in the United States the editors and broadcasters meet with many people both in and out of Washington. They live the life of their counterparts in this country. . . follow the same routine and try to have part of the techniques rub off on them.

It has been suggested that while here, members of this group might be interested in meeting with representatives of the agricultural chemicals industry. This would broaden their contacts and would give American business a first hand account of how to reach farmers with both practical farm information and sales ideas. There is some interest in the proposal.

The matter of information is considered of utmost importance in dealings with most other countries. One reason is that farmers often do not have the constant popularized reporting of scientific developments we have available here. The farm press and radio are not developed to the

How Bright are the Prospects For Bigger Foreign Markets ?

same degree. In some cases, the farm press and radio, if they exist at all are dominated by the government to the extent that it is difficult to present information objectively.

Furthermore, where it is possible to encourage the further development of information media on an independent basis, American business may find itself in a position where it is to its advantage to help support the publication or broadcast service by advertising in the same manner and with the same expectation of profit as advertising is engaged in here in the United States.

There now appear to be several possibilities in Europe, especiall· with publications. Radio too is developing quickly. The Rome meeting of European Radio Farm Directors this spring shows what can be accomplished in a few years. Several top U. S. radio farm directors have spent four to five years in Europe working with existing farm directors and encouraging the establishment of farm departments as a part of station operations. Some areas seem ripe for further action.

A business representative for an important segment of the fertilizer industry, Mr. George A. Zeigler, managing director of the Potash Export Association has recently made a survey of twent/ South American countries. (*Agricultural Chemicals*, April, 1954. Pgs. 12-13) You might call his mission, "test tube diplomacy." While in South America, Mr. Zeigler met with soils men to gain more first hand information about the prospective needs for potash and other fertilizer materials. He also explored the technical problems which would be faced by business firms selling in certain South American markets.

The term "test tube" is not an idle one, for Mr. Zeigler reports that it is of top importance to encourage the spread of soil testing throughout many areas of South America. Those who worked with the U.S. soil testing program will recall many of the obstacles and problems which had to be overcome before it became possible for U. S. farmers to send a pint of soil in an ice cream carton to the county agents' office or college for testing. Yet because of the availability of the soil test, farmers have scientific proof of the need for fertilizer materials on their own farms.

It is certainly worthy of mention that many U. S. fertilizer companies are doing a splendid job of supplementing this soil testing program by making soil tests for farmers who might not otherwise take the time and trouble to have the analyses made.

Progressive programs like that undertaken by the Potash Export Association set a firm foundation for an expansion of fertilizer consumption which can be of tremendous value to the farmers in the country involved as well as the business firms which make the actual sales. This South American work is now being followed by further studies reaching into Asia and the Middle East.

Recognizing this surge of interest in foreign business, a number of organizations are moving to serve their members or customers in this

Value of United States Exports of Pesticides, by Countries of Destination, 1949-53.[1]

Area and Country	1949	1950	1951	1952	1953[2]
North America	10,035	16,438	28,117	25,293	24,106
Canada	4,067	5,855	6,327	7,536	7,997
Costa Rica	736	1,163	1,571	1,915	551
Guatemala	835	1,210	1,169	1,220	1,758
Honduras	1,092	1,227	1,472	2,489	2,637
Mexico	2,250	5,643	14,524	9,013	7,959
Nicaragua	83	498	1,030	894	1,076
Panama	603	407	796	989	1,049
Salvador	226	363	1,174	1,182	1,009
Other	143	72	55	55	70
South America	5,910	8,191	19,011	16,289	9,914
Argentina	149	178	2,303	896	247
Brazil	2,642	4,174	9,420	7,372	2,615
Chile	64	95	241	372	546
Colombia	1,230	1,037	2,539	2,669	2,059
Ecuador	105	168	248	276	363
Peru	637	639	1,210	1,990	1,391
Uruguay	141	139	274	147	91
Venezuela	810	1,684	2,624	2,423	2,458
Other	132	78	152	143	143
Caribbean Area	916	1,350	1,699	1,909	1,710
British West Indies	65	84	116	160	101
Cuba	613	981	1,160	1,334	1,291
Dominican Republic	122	165	252	290	109
Haiti	56	46	88	30	119
Other	60	74	83	95	90
Europe	5,261	3,434	6,537	5,619	3,445
Belgium	508	211	617	492	175
Denmark	140	175	97	59	46
France	91	70	856	1,003	297
Greece	1,141	339	905	307	49
Italy	1,446	1,512	888	456	645
Netherlands	395	130	291	130	251
Norway	141	69	68	93	87
Portugal	24	65	125	67	43
Spain	27	4	322	117	4
Sweden	140	227	177	132	76
Switzerland	125	301	461	292	251
Turkey	716	133	1,263	2,205	1,160
United Kingdom	73	107	268	109	132
Other	294	93	200	157	229
Asia and Oceania	4,191	2,578	5,859	7,351	8,942
Australia	157	67	209	149	173
British Malaya	18	3	128	168	29
Burma	—	2	101	5	206
Ceylon	447	26	109	528	155
India	144	87	690	1,932	2,587
Indonesia	615	429	570	781	734
Iran	141	369	551	66	451
Iraq	17	22	65	47	90
Israel-Palestine	199	70	116	240	190
Japan	824	271	468	781	1,590

(*Turn to Page* 139)

field. The National Agricultural Chemicals Association is continuing the activities of its Foreign Trade Committee headed by J. M. Merritt, Tobacco By-Products & Chemical Corporation. During several of its meetings, the committee has acted to develop close relationships with U. S. and World organizations concerned with pesticide chemicals for both health and agricultural pest control. The committee has compiled a list of all the government agencies involved in exports.

It is recognized that all businessmen share the good will resulting from the export of high quality materials formulated for the purpose expressed by the buyer. The wide range of materials offered by U. S. manufacturers provides buyers with many opportunities for making wise purchases.

In a completely different vein, other services are being offered those in the foreign market. Standard Rate & Data Service, Inc., referred to by those in the advertising business as the time and space buyers "bible," are contemplating a South American edition, the first in their history.

Still another indication of growing business interest in the foreign market is the establishment of overseas offices by one of the nation's largest public relations firms, Hill & Knowlton, Inc. The new services offered include the facilities of four Western European firms located in the United Kingdom, France, Belgium, Switzerland, and the Netherlands. A further overseas connection was established by Hill & Knowlton in Australia in the form of a subsidiary company.

According to the firm, these overseas offices are established because of the interest shown by American business in world conditions which affect management decisions. Its own clients require such facilities. Staff members traveled over 100 thousand miles earlier this year making studies leading to the establishment of these overseas offices.

During this post war period there has been quite an increase in the dollar volume of agricultural chemical

(*Turn to Page* 139)

Around the farm in a wagon . . .

Conn. Displays Its Research At Field Day

AROUND the farm in a wagon was the theme late last month at the annual Connecticut Agricultural Experiment Station Field Day. Staff members at the station acted as guides on tractor-pulled wagonloads of visitors which toured the various research plots at the station experimental farm in Mt. Carmel.

Nearly 500 interested farmers and home gardeners visited the farm Sept. 18 to learn what's new in the world of plant science, particularly new research at the Connecticut station.

Tests with weedkillers, soil conditioners, fertilizers and insecticides all were on display for the visitors to see. Perfect weather and excellent planning by Dr. James G. Horsfall, director of the station and his staff, combined to make the Field Day highly successful.

Highlighting the program was an interesting account of plant diseases, with references going back to Biblical times, by Dr. Horsfall. He chose the picturesque title "The Rots and the Rusts, the Blasts and Blights That Beset Us," for his discussion of some of the famous plant diseases of antiquity, some of which altered the course of history. He also told the story of plant disease research at the Connecticut station, including the field work done at the Mt. Carmel farm.

Specific plant pest problems were aired at the clinic which followed Dr. Horsfall's talk. Neely Turner, of the staff, was leader of the clinic. John Lyman, vice president of the station board of control and a leading state fruit grower, presided at the meeting.

A popular part of the program, which ran from 10 a. m. to 5 p. m., was a series of walking tours to plots of special interest. In addition, automobile tours to the fruit and chestnut orchards were provided.

A number of exhibits, illustrating new station research which could not readily be demonstrated in the field plots, were on display in the main barn at the farm.

The walking tours included one to the plant breeding fields, another through the plots where insect control work is going on, and a third to plots where research on disease control is in progress. The third tour included a spraying demonstration. All three tours were popular with visitors at the field day.★★

Dr. James G. Horsfall discusses the history of some important plant diseases in an address at the annual Connecticut Agricultural Station Field Day. Dr. Horsfall is station director.

A Connecticut staff member goes over the procedure in a typical laboratory test with a visiting farmer. The field day was held at the Mt. Carmel experimental farm, with more than 400 attending.

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100 Years of Entomology...

PART IV

CONTEMPORARY ENTOMOLOGISTS CONCLUDE REVIEW OF THE PAST 100 YEARS OF DEVELOPMENT AND PROGRESS

OPPORTUNITIES for Entomologists IN INDUSTRY

By Bruce D. Gleissner
Diamond Alkali Co.,
Cleveland

I HAVE the pleasure of writing on the constantly expanding field of opportunity for recent graduates of entomology. From a handful of commercially employed entomologists of twenty years ago, the field of commercial employment has increased until it is the largest single group in the profession today. The late Dr. Rohwer estimated over five years ago that employment of entomologists was about equally divided between the Federal Government, State Governments and industry. Since that time, demand for entomologists in industry has increased at a much faster rate than in the case of public agencies.

This increase in employment by industry has been most pronounced since the end of the second World War. Beginning with the introduction of DDT, dozens of new insecticides have been brought to the market and many are in various stages of development. Each new compound has required the services of additional entomologists. They should have a deep affection for the chemists, since every time a chemist synthesizes a new chemical which is shown to have insecticidal properties, more jobs in entomology are opened up!

It might be best to follow a new chemical through discovery, development and finally sales to point out areas where entomologists are essential in industry or associated with industry. Screening tests, devised by entomologists, are used by industry to sort out the useful from the worthless chemicals as insecticides. Entomologists and chemists work together closely in these endeavors in the laboratories of dozens of the more basic chemical manufacturers and outside laboratories at institutes and experiment stations receive grants from companies for these studies. Once the compound has shown promise, laboratory entomologists must elaborate the various properties of the chemical in order to lay the groundwork for field development. Many more entomologists are required for development work and finally, entomologists are required to conduct the liaison work between the chemical companies and the agricultural experiment station workers. In addition to cooperative work with experiment stations and other institution laboratories, many chemical companies maintain year-round field testing laboratories for studying their new candidate insecticides. The data obtained at the State and Federal experiment stations must then be assembled by competent entomologists and presented to registration authorities to obtain clearance for label claims which are the foundation of eventual sale of the chemical under safe and effective procedures. Finally, when the chemical has been brought to this stage and is for sale, the technical staff, including entomologists, must write the literature, supervise the technical apects of advertising and conduct extension and educational activities with the company's own salesmen and the representatives of their customers.

It can be seen from this short review, except for several of the purely scientific endeavors of entomologists such as studies on taxonomy and morphology, all the special knowledges considered in the science of entomology are required by industry in their direct employees. Most of the larger companies have their staffs subdivided into about four major categories.

1. Entomologists to work on screening, toxicological and physiological studies associated with discovery of new, useful insecticides.
2. Entomologists to take the chemicals from the laboratory to the field.
3. Entomologists to furnish technical service to the sales and advertising departments.
4. Entomologists as salesmen.

There can be considerable overlapping in these four categories, but young graduates truly interested in the economic aspects of insect control

can find a satisfactory area for employment in one or more of these four phases.

The field of activity is generally arrived at by mutual agreement between the management and the individual as to where he best fits. For example, individuals wishing to work with the basic details are better fitted for laboratory work, whereas those who have a liking for meeting people, disseminating information and interpreting relationships between the company's compounds and competitive materials, are better fitted for development work and sales.

In summary, it can be said that there are opportunities for employment in industry for entomologists in just about every category of the profession that is available in public institutions. The salesman must teach, just as the extension worker or classroom professor. The development entomologist must conduct field tests and interpret data just as the experiment station worker, and the laboratory research entomologist conducts his studies in a manner comparable to many experiment station and nonprofit institution researchers, including the rearing of test insects, devising of test procedures and certain physiological studies.

Since all young graduates are interested in the remuneration for their labors, a word about that. Contrary to popular belief, the differential between salaries for industrial workers and employees of public agencies is not too great. The salaries in industry may average slightly higher and increases may come more rapidly as a reward for good work, but the additional compensation is a reward for the more exacting demands made by industry on the individual. These include the absolute requirement of cooperative effort with all the other specialists in the development of a new chemical. Each phase of the development work must be done to the corporation's time schedule and the individual's line of work must be subject to management's direction in a more precise manner than that required by most public agencies. The industrial entomologist is generally required to travel considerably because his activities are directed on a broader geographical front and this, naturally, results in inconvenience and disruption of his personal life. Work and travel in many different areas of agricultural production, however, has its compensations in enriching the knowledge of the individual.

There is another widely held misconception connected with the requirement that the industrial entomologist must be completely devoted to his employer's best interests, therefore losing some independence of action. In well managed companies, no entomologist need submerge his independence of thought and action to the detriment of his professional standing. In fact, it is mandatory that honesty be present in all technical and sales efforts of both the individual and his company. The market place is the most trying test of how truthfully and thoroughly a chemical is developed and sold. In fact, if there is deviation in any category, the corporation will be found out by the customer, to its financial loss. Competition sees to that and the market place rewards the best competitor.★★

A Historical View of Entomological Problems

By Alvin Boyce

Citrus Experiment Station,
Riverside, Calif.*

DURING the early years of entomology, technical men had a very difficult time. Many nostrums and quack materials were widely advertised for control of insect pests, and therefore the real entomologists frowned on the use of any chemical. They generally recommended use of simple means of control based on an intensive study of the life history of the pest. One early 1856 recommendation was a concoction of whiskey, aloes and water.

Outbreaks of pests had a considerable effect in stimulating the early development of the science. The more important of these pests and dates of their occurrence were: 1850-83, Glover scale prevalent on citrus; 1850 Colorado potato beetle, by 1874 it had spread to the east coast; 1850 cotton leaf worm and cotton boll worm, which later resulted in the development of calcium arsenate dust; 1870 San Jose Scale in California, 1893 it reached the east coast and stirred up countrywide interest in control; 1869 Cottony cushion scale aided development of biological control; 1859 Rocky Mountain locust first noted, 1875 serious, and arousing interest; 1872-4 codling moth in California stimulated research; 1872 paris green first used in the east; 1872-3 California red scale, by 1880 serious on citrus and a major problem; 1884 cotton boll weevil caused special interest in that problem in Texas; 1889 Gypsy moth; 1897 Brown tailed moth; 1897 Anopheles mosquito first controlled with paris green; 1900 Japanese beetle in New Jersey; 1916 Oriental peach moth; 1916 Mexican bean beetle; 1946 Oriental fruit fly, which stimulated some of our finest entomological research work. The Mexican fruit fly is now quite close to the California border, and will most probably stimulate a repetition of the work done in Hawaii on Oriental fruit fly.

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In 1854 there was little to work with—soap, sulfur, tobacco, and quassia. Development of carbon bisulfide was the first truly organic insecticide, which was used widely for fumigation of grapes for phylloxera control. A little later sulfur and tobacco dust were developed, and in 1860-85 kerosene emulsion was developed. 1863 marked the start of work with petroleum sprays; 1864 DDT first formulated; 1888 pyre-

(*Turn to Page 145*)

*Presented before Pacific Branch, Entomological Society of America, Bend, Oregon, June 23, 1954.

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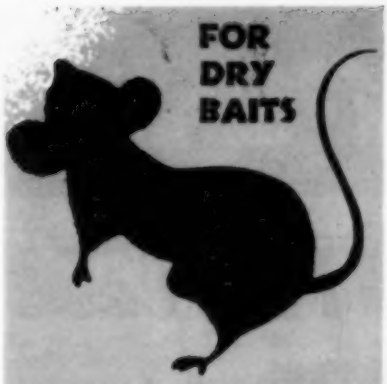

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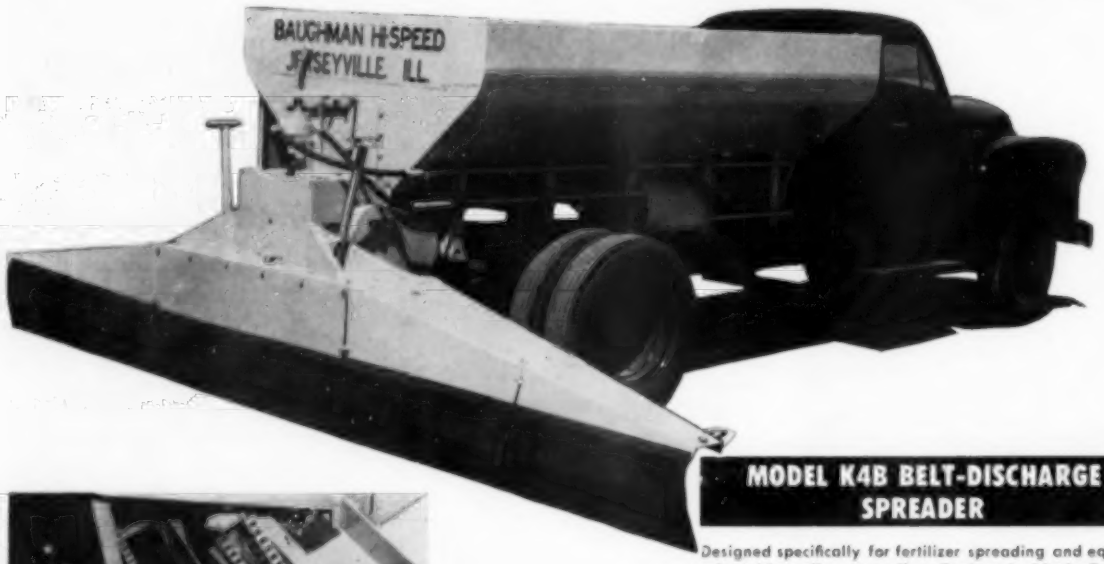

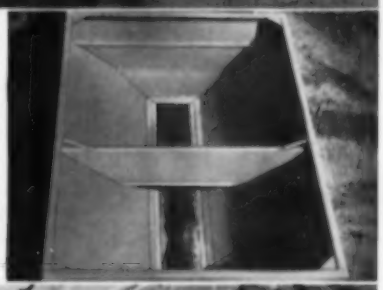

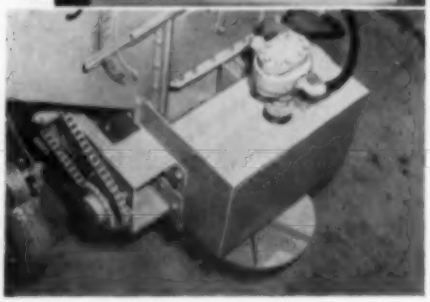

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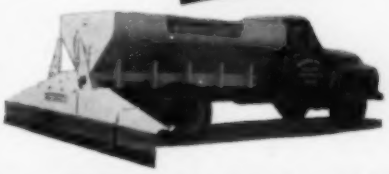

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LISTENING
Post

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

Control of Tobacco Blue Mold by Antibiotics

JOHN J. Grosso of the U. S. Department of Agriculture reports a series of greenhouse experiments to test the fungicidal value of various antibiotics in the control of the blue mold (*Peronospora tabacina*), disease of tobacco.

Spray treatments were begun when the leaves were approximately the size of a silver dollar and continued at three- to four-day intervals for a total of four applications. The day following the second application, the plants were placed in an incubation chamber and inoculated on two successive days with a water suspension of spores. Five days following the last spray treatment the amount of blue mold damage was recorded.

In the first series, Thiolutin at concentrations of 0.8, 2.4 and 7.2 p.p.m. was used. Results showed that Thiolutin at all three concentrations gave no control of blue mold.

In the second series of tests, 0.01% aqueous spray solutions of the following antibiotics were used: Bacitracin, Catanulin, Magnamycin, Polymyxin, Sodium Penicillin, Sodium Rimocidin, Sodium Salt PA95, Streptomycin sulfate, Terramycin hydrochloride, and Thiolutin. The amount of leaf killing ranged from 1.8 percent for Streptomycin sulfate to 40.6 percent for Bacitracin. The Dithane-treated check had 1.7 percent leaf injury while the figure for the untreated check was 30 percent. (See Table 1).

As a result of this experiment, another was conducted with Streptomycin sulfate, using 0.02 percent, 0.01 percent, and 0.005 percent aqueous solutions. In all three replications the 0.02 percent and 0.01 percent solutions were far superior to the Dithane-treated check, averaging 1.1 percent and 5.2 percent leaf injury, respectively. The 0.005 percent solution was inferior, averaging 19.4 percent damage. The Dithane-treated check averaged 12.7 percent injury while the untreated check averaged 50 percent. (See Table 2).

Thiuram Polysulfides as Field Fungicides

SAUL Rich and James G. Horsfall, of the Connecticut Agricultural Experiment Station, report the results of field tests during 1953 of a series of thiuram polysulfides from Rohm and Haas Co. The composition and code numbers of these materials are ethylenebisthiuram tetrasulfide (Ho 257), tetramethylthiuram trisulfide (Lo 737), ethylenebisthiuram trisulfide (Lo 738), and tetramethylthiuram tetrasulfide (Lo 765). The materials were wettable powders and were applied by hydraulic equipment. They were tested for control of apple scab, (*Venturia inaequalis*), blight of tomatoes, (*Alternaria solani*), and snapdragon rust (*Puccinia antirrhini*).

The apple scab trials were made on large McIntosh trees, using the half-tree technique. The sprays were applied at a pressure of 300 p.s.i. Spray dates were April 9, April 22, May 4, May 19, June 1, and June 16.

Table 1. Tobacco blue mold control with various antibiotics

Treatment	Disease Index*	Treatment	Disease Index*
Check	30.0	Sodium Salt PA95	14.5
Dithane	1.7	Magnamycin	14.9
Streptomycin SO_4	1.8	Terramycin HCL	16.6
Polymyxin	7.2	Sodium Penicillin	26.7
Thiolutin	7.6	Catanulin	33.6
Sodium Rimocidin	13.3	Bacitracin	40.6

*100 = All leaves destroyed.
0 = No disease.

Table 2. Tobacco blue mold control with streptomycin sulfate

Treatment	Disease Index Block 1	Block 2	Block 3	Mean
Check	59.0	55.0	36.0	50.0
Dithane 3 lb. per 100 gal.	13.5	14.4	10.3	12.7
Streptomycin SO_4 0.005%	16.0	22.2	19.9	19.4
0.01%	5.0	6.6	4.0	5.2
0.02%	0.5	1.9	0.9	1.1

*100 = All leaves destroyed.
0 = No disease.

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Leaf scab data, taken on July 2, were based on reading 100 leaves per half tree or 400 leaves per treatment. Fruit set was insufficient for adequate fruit data.

Trials on tomato early blight and snapdragon rust were made in spirally arranged plots using a spray pressure of 250 p.s.i., and a rate of 200 gallons per acre. The tomatoes (Chatham variety) were sprayed on August 26, and September 3, 9, and 16. The data, taken September 17, are based on estimated defoliation of 5 plants per plot, or 20 plants per treatment. The snapdragons (variety Afterglow) were sprayed on July 8, 15, 22, 31, August 6, 20, 27, September 4, 22, 30, and October 6. The plants were inoculated with rust on September 9, and the data were taken September 15. The data are based on estimated percentage of total leaf area involved by rust pustules for 5 plants per plot, or 20 plants per treatment. Standard fungicides were included as separate treatment in all trials.

The data (Table 3) are given in average percentage of disease as converted from average disease grade. The following discussion is based on analyses of variance of the disease grades. Statistical significance is expresed at the 5% level in all cases.

For controlling apple scab, all spray treatments were significantly better than the check. According to effectiveness of control, the spray treatments could be separated statistically into three groups. The least effective group included both concentrations of He 257 and Lo 737, and the low concentrations of Lo 738 and Lo 765. The middle group included the high concentrations of Lo 738 and Lo 765, and the mixture of Fermate with sulfur. The most effective group included Phygon and Orthocide 406.

An analysis of the tomato early blight data showed that the following treatments were not significantly different from the check: Phygon, both concentrations of He 257 and Lo 737, and the low concentration of Lo 738. The following treatments were significantly better than the check: Dithane Z-78, Orthocide 406, the high concentration of Lo 738, and both concentrations of Lo 765. The treatments in the last group did not differ significantly one from the other.

All of the treatments for the control of snapdragon rust were significantly better than the check, except Phygon and the low concentrations of both He 257 and Lo 737. The following treatments, however, were less effective than Dithane Z-78 or the high concentration of He 257 for the control of snapdragon rust: Fermate, both concentrations of Lo 738 and Lo 765, and the high concentration of Lo 737.

The results of these field trials show that certain thiuram polysulfides are effective protectants against foliage diseases.

Table 3. Comparative disease data for fungicide trials of thiuram polysulfides, from tests at Connecticut Agricultural Station, 1953.

Material	Concentration of formulation per 100 gal.	Average percent apple leaf area covered by scab	Average percent defoliation of tomatoes by early blight	Average percent snapdragon leaf area showing rust pustules
HE 257	½	13.1	11.5	18.7
He 257	2	8.9	15.0[a]	3.3
Lo 737	½	12.0	11.5[a]	17.0
Lo 737	2	13.7	14.0[b]	11.7
Lo 738	½	11.8	9.0	8.0
Lo 738	2	6.6	6.5	5.4
Lo 765	½	7.3	4.5	14.0
Lo 765	2	6.0	4.0	12.5
Phygon XL	½	1.8	8.5	42.0
Orthocide 406	2	1.8	4.0	11.0
Fermate + Sulfur	1 + 3	3.0	—	—
Fermate	2	—	—	6.2
Dithane Z-78	2	—	3.0	3.0
Check	—	48.8	15.0	39.5

[a]Slight injury.
[b]Moderate injury.

Corn Borers, Armyworms, Grasshoppers Still Active

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Economic Insect Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture, Washington. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the United States.

By Kelvin Dorward

European Corn Borer Threatens

THE insect attracting major attention during August in the corn growing states was the European corn borer. At the first of the month Iowa reported egg counts for second generation varying from 0-150 per 100 plants, with first-brood infestation of plants running from 70-90 percent. According to entomologists in that State all evidence indicates the most severe infestations since 1949. In Illinois indications also pointed to heavy second-brood moth flights and heavy egg-laying over the area north of Bloomington, even though the first-generation was spotted in some areas. First-generation infestation in Minnesota was running up to 65 percent (southwest district) and if borer development escapes significant retardation by weather, appreciable second-generation damage is expected. Early in the month it appeared that corn to be harvested after about August 25

(*Continued on Page 81*)

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would require treatment in Minnesota. Wisconsin was also anticipating a heavy build-up along the Minnesota, Illinois and Iowa borders, and South Dakota had a very heavy first-brood infestation, with heavy damage expected from the borer this year.

Hoppers and Armyworms Still Active

SEVERE grasshopper damage to crops continued in several states, especially Kansas and Missouri. Heavy damage to field crops continued over Missouri and in the eastern area of Kansas where only the stalks remained in many corn fields. The situation in Missouri was aggravated by drought conditions. The build-up continued over most of Wisconsin, and crop damage was becoming more serious by the middle of the month, with control activities not keeping pace with the infestations. South Dakota was also having alarming increases, especially in the central and western counties, while infestations in Illinois were heavier than in the past few years, and Indiana treated thousands of acres for control of grass hoppers. Other states reporting trouble from grasshoppers in crops included Arkansas, Oklahoma, New Mexico, and Nebraska.

The armyworm problem had spread from Maine to Montana to New Mexico by early August, with some states reporting widespread outbreaks. Vermont had heavy damage generally in the Champlain Valley, with heavy populations over the entire State. Massachusetts reported damage over large acreages in the eastern area, and Rhode Island and New York experienced extensive infestations in corn, oats and hay. The heavy infestations in South Dakota and Minnesota were subsiding by August 1. Early estimates revealed that between one-half and three-fourths million acres were treated in the latter State against the armyworm during the latter part of July. Wyoming and Montana had heavy local infestations in several counties on oats and other crops while New Mexico and Colorado reported severe damage over wide areas.

Fruit Insects

THE most important pest activity in orchards concerned mites and the codling moth. Mite populations were high and causing damage in some orchards in Massachusetts, New York, Kentucky and Indiana. Contrary to early expectations the codling moth infestation in Indiana was generally high and considerable damage has resulted. Injury is higher in the northern area than for several years. Second-brood injury was also greater than normal in some apple orchards in New Jersey, but appeared very light in northeastern Ohio and generally light in Kearneysville area of West Virginia.

Cotton Insect Conditions

IN general, cotton insects were under better control during the first half of August than during the same period in 1953. Boll weevil infestations were lower on the whole, with

(*Turn to Page* 139)

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WASHINGTON *Report*

by
Donald G. Lerch
Cornwell, Inc., Washington, D. C.
(Agricultural Chemicals Washington Correspondent)

HIDDEN under the bitterness of debate over the new farm law is to be found, perhaps the most important feature of it . . . the formula for changing the pattern of crop acreage. Most of the time in Congress was taken up with argument over the level of price support, with the real fight centered between those who wanted a continuation of the 90% parity supports and opponents who demanded lower government price props. The purpose for seeking lower floors was all but lost.

The Administration feels that with lower props farmers will be given more incentive to search for new ways to make money. This search will be given a big push by an administrative action taken by the Secretary, which by itself, would almost do the trick. This action is the exacting "cross compliance" edict which means that unless a farmer falls in line with the overall farm control program, he cannot receive support for any crops grown, even those which are planted within the limitations set by the County Boards which will parcel out the available acreage for crops under control.

Actually, this "cross compliance" stipulation may have more effect than the price action taken by Congress. Under the new set of measuring sticks, wheat would fall 18 cents a bushel to a national average support of $2.06. Corn will probably fall no more than four to five cents on a national basis, running just under $1.60 per bushel. Declines in prices for peanuts and rice will be equally slight. Cotton supports will stick at about 31½ cents a pound according to present estimates

Thus, the difference between 82½ percent of parity for basics and the old 90% is'nt as big as some of the speeches would have you believe. But, combined with "cross compliance" there may be some pretty wild shifts in acreage which would have a direct bearing on fertilizer and to some extent pesticide sales.

By concerted progressive action over a period of years the fertilizer folks have broken through the barrier of farm income — fertilizer sales relationships. Fertilizer sales have gone ahead of the direction of farm income movement.

Fertilizer consumption is also governed by kind of crops grown. Some crops respond more to fertilizer than others. Some repay more profit per dollar invested. Some have automatically qualified as crops which it pays the farmer to fertilize heavily, others have not. County Agents and extension agronomists are in the habit of making recommendations on a set of conditions which has been following a rather uniform pattern. Now that some of the pieces are changing and fast, real leadership will be needed.

In time of change there is sometimes a wide gulf between official reports and the situation as it really exists. Time spent along the nation's system of secondary roads may be exceptionally profitable. The factor of flexibility for price supports in agriculture seems to show the desirability of flexibility in business planning also.

* * * * *

One service of the USDA which seems to offer possibilities is the weekly review of the insect situation which is carried in the official Radio Letter mailed to all leading radio farm and television directors in the nation. There are many other ways the government gets this information to those in the industry. And many companies have their own staffs. The point is that here, the information is going from official sources to those who every day talk to an estimated audience of 88 million persons on farms and in the cities.

The service these radio farm directors perform is recognized by farmers and farm leaders. These regular reports about insect outbreaks, their movement and control, can serve to help the industry and farm leaders develop a greater awareness among farmers of the profits to be made by controlling insects and plant diseases more effectively.

Next time you are in Washington, or when you next write to the Department you might inquire about seeing a sample copy of the "RFD LETTER." It's issued by the Office of Information. While the mailing on a regular basis is restricted to those in the radio and television field, I'm sure you can get one for study.

* * * * *

It is perhaps a stroke of fortune that the new Commissioner of the Food and Drug Administration, George P. Larrick takes office almost simultaneously with the enactment of Public Law #518, The Miller Pesticide Residue Admendment. This is what has been called for months The Miller Bill, for Congressman Miller (R. Neb.) who sponsored the Bill in the House.

Mr. Larrick has been involved in most of the preliminary work on the measure and he now has the opportunity and the responsibility for putting it into effect. This is of course only one of his responsibilities, but certainly one requiring his immediate and continued attention at least until

the procedures are established and the law may be said to be functioning.

The new Commissioner is well known to members of the pesticide industry. Just a year ago, during the fall meeting of NAC at Spring Lake, N.J., Mr. Larrick delivered an address on Food and Drug Administration matters as they affected the pending legislation. He took advantage of the opportunity to meet many members of NAC and many of the informal conversations probably helped develop a better understanding which proved very useful later during the many hours of negotiations in Washington which eventually led to agreement on the provisions of the new law. Larrick, a career man, succeeds Charles P. W. Crawford, also a well known career man.

Conferences on the administration of the new law are now in progress. The matter of fees, injected into the bill at the last minute, is raising a good many questions. Fees to pay for services required by law is a policy of the Administration. It is a major factor in view of the decline in Food and Drug appropriations which amounts to over 10% during the past four years. The law provides for fees, which are to be paid by industry and as such will add to the cost of production.

Another arm of the Departmeat of Health, Education and Welfare, is continuing its study of the residue problem and will make valuable contributions to succeseful operation of tolerances, judging by the record. It is the Public Health Service, Dr. David E. Price, Assistant Surgeon General, demonstrates by his attendance and participation in the NAC meeting, that his Agency has a key role to play in the establishment of workable relationships concerning residue tolerances.

His address and the panel discussion of how to operate under Public Law #518 with Food and Drug and USDA officials participating, will effectively demonstrate the cooperative spirit surrounding the launching of this new era of accepted and recognized residue tolerances. Continuation of this attitude should result in the law accomplishing its purpose.

* * * * *

Another highly interesting observation in connection with the NAC meeting, to be held at Spring Lake, N.J., September 8-10, is the appearance of Kenneth H. Anderson, Associate Director, National Committee on Boys and Girls Club Work, generally called 4-H Clubs. Mr. Anderson is certainly well qualified to speak on the importance of youth to the future of the agricultural chemical industry.

This attention to the role of youth by the industry indicates an awareness of the problem of building a sound base for increased application of materials in the future. Certainly, few if any industries have progressed more in the past decade. The amazing development of the industry is bewildering enough for those in it. It can easily be utter confusion to those it is supposed to serve unless broad educational programs including youth are really successful.

The more youth understands the role of the industry in agricultural progress, and the better industry understands the problems of the young farmer, the faster the two can make new progress together.

This new look at youth may generate more cooperative work. Some of the NAC members conduct outstanding youth programs including 4-H. But the industry as a whole has an opportunity here that can pay dividends.

* * * * *

The fertilizer industry is wondering how effective the report of the Senate Appropriations Committee will be in making possible more competitive bidding on foreign orders. The Committee ordered FOA to ". . . review its bidding and award procedures with a view to adjusting them in such a manner as to enable United States suppliers to compete fairly with foreign suppliers insofar as prices of commodities themselves are concerned and to make necessary allowances for higher costs of shipping on United States-flag vessels."

In short, this is being taken to mean that at least the government should equalize the big difference in freight rates on U.S. ships. There have been months of argument and discussion with little concrete improvement in the situation. Now there is hope that things will improve.

* * * * *

Elsewhere in this issue you will find an article dealing with the factors influencing the expansion of foreign trade in both fertilizer and pesticide materials. One area apparently ripe for further development is South America. Considerable business exists now, but according to some who have just returned, it's only the beginning.. Approached from the viewpoint of "test tube, not dollar diplomacy," the field is tremendous.

* * * * *

The addition of the 1000 new assistant county agents in the months ahead is important because it marks the beginning of a trend to build up the Extension Service. Until this year, when appropriations were increased 8.3 million, the Service has been losing strength rapidly. Its position was weakened not so much from reduced funds, as from its relationship to other agencies for the Department which enjoyed considerable increases in money. As some put it, "the open season on County Agents is now closed."

However, the direction of the entire County Agent system is still in the hands of the states and counties. The power of the Federal Government is not increased by this latest appropriation. Therefore, there can be no new master farm plan from Washington as some had predicted.

The County Agent is to have a more important role in dealing with farmers. This is something to keep in mind when building plans to sell farmers.

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Technical SECTION

"Ceresan" Seed Disinfectant Controls Snow Mold in Wheat

WHEAT sprayed with "Ceresan" seed disinfectant (product of du Pont de Nemours & Co., Wilmington, Del.), is reported to resist damage due to snow mold, which is caused by fungi that thrive under a deep blanket of snow.

Dr. Roderick Sprague, of the Washington Agricultural Experiment Station, started testing the standard "Ceresan" M seed disinfectant formulation for "snow mold" control in 1949. For four seasons, he has obtained good control with dry applications consisting of five pounds per acre of "Ceresan" M mixed with 40 pounds of fertilizer as a carrier. (When used for seed treatment, the per-bushel dosage of "Ceresan" M amounts to about a half-ounce.) These were applied to the young wheat in late fall before winter snows. Trials in recent years have been on the farm of Jim Petersen near Mud Springs in Douglas County.

During the 1953-1954 season, six tests in the Fairfield and Tetonia areas of Idaho demonstrated effectiveness with "Ceresan" applied as a spray—two and one-half pounds of "Ceresan" M-2X (equivalent in strength to five pounds of "Ceresan" M) in 20 gallons of water. Practically 100 per cent control of the disease was achieved, even when snow mold completely wiped out wheat in untreated areas.

The work at the Tetonia Branch Experiment Station of the University of Idaho has in previous years been confined to the effect of various cultural methods on the control of snow mold. Chemical treatments were started in the fall of 1952. Fertilizers have not proven economical at the Tetonia Station, so present work has been concentrated on spray application of fungicides.

In the Idaho tests, "Ceresan" M-2X seed disinfectant was applied with a weed sprayer, and "Ceresan" M, mixed with "NuGreen" fertilizer compound, was applied dry in November before snow came to stay. Results were evaluated in mid-May. M. C. McKay, superintendent of the Tetonia Branch of the Idaho Agricultural Experiment Station, arranged for replicated quarter-acre plots in front of a snow fence at the branch station. Test treatment was also applied to larger plots on the Nelson Farm which adjoins the Tetonia station property. In addition, two-acre plots were treated on the Idaho farms of Bill Simon, Levard Hansen, Ma Hanson, and Larry Giesler, all of Fairfield. Wayland Muffley, a farm supply dealer in Fairfield, assisted in setting up these trials. Gwinn Rice, of Hill City, Idaho, who treated a 150-acre field with "Ceresan" on his own initiative, reported excellent control of snow mold.

In dry applications, "NuGreen" fertilizer compound, at 40 pounds per acre, has been used as a carrier for the "Ceresan." "Nugreen" has also been included in some of the mixtures when "Ceresan" M-2X seed disinfectant has been applied in sprays for snow mold control. Thus application costs can be reduced by combining snow mold control and nitrogen fertilization in one treatment if it is desired. The addition of nitrogen in these applications helped promote recovery of injured wheat, but did not have any direct effect on disease control.

Ketones Increase Toxicity of Spray Residues

Substitution of methyl ethyl ketone for oil as a solvent for DDT insecticides gives a very appreciable increase in toxicity of spray deposits, according to findings of research workers of the USDA's Agricultural Research Service at Beltsville, Md. DDT oil solution sprayed on foliage of spruce and pine trees was effective against flies for only 15 days, but when methyl ethyl ketone was substituted for oil as the solvent, effective toxicity was extended to 60 days or longer.

Applied as an oil-base spray, DDT does not form long-lasting residues on foliage because the oil — carrying the DDT — penetrates into the leaf. However, when a highly volatile solvent such as methyl ethyl ketone is substituted for the oil in DDT sprays, it quickly vaporizes when sprayed so that only a residue of DDT remains on the foliage surface.

Similarly, the lasting effectiveness of other insecticides, such as aldrin and lindane, was improved by addition of chlorinated terphenyls (a resin-like material) to the spray. When used as normal oil or emulsion sprays, aldrin and lindane retain their fly-killing ability less than 10 days under outdoor weather conditions. In combination with the chemical extender, they provided nearly perfect fly control for more than 102 days.

With aldrin and lindane sprays, using methyl ethyl ketone in place of oil only partially solves the problem of making these foliage sprays long-lived. Unlike DDT, these two insecticides are relatively volatile materials themselves. The scientists slowed down their rate of evaporation by adding a chlorinated terphenyl to the spray solution. These insecticides

are soluble in the non-volatile chlorinated terphenyls and as a result the vapor pressure of the insecticide is lowered.

When methyl ethyl ketone insecticide sprays were applied with either a power sprayer or mist blower, very concentrated solutions containing approximately 50 percent by weight of the insecticide extender were used. The methyl ethyl ketone began to evaporate almost as soon as the spray left the nozzle. As the material evaporated, the spray droplets became small insecticidal pellets averaging between 50-100 microns (about 1/250 to 1/300 of an inch) in diameter, which carried for relatively long distances. The pellets adhered strongly to such target surfaces as foliage, forming a uniform deposit over the leaf or branch, but not penetrating or otherwise damaging it. The residues did not readily wash or weather away.

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Methyl Bromide for Rice

Rough rice can be fumigated successfully in flat farm type storage bins, designed for drying by aeration, by using methyl bromide in a closed circulation system. A farm-type bin was economically sealed to provide gas-tight fumigation conditions. A complete mortality of all stages of insects was obtained using the dosage of 2 pounds per 1,000 cubic feet, and a relatively uniform distribution of the fumigant was obtained. T. S. Brook, L. N. Redlinger. Texas Agric. Exp. Sta., College Sta. Tex.

•

Phosphorus Insecticides

Entomologists and veterinarians investigating insects affecting livestock at the Kerrville, Tex., laboratory of the Agricultural Research Service report that diazinon given by mouth and under the skin and chlorthion and dialkyl phosphate given yearling cattle by mouth killed cattle grubs for as long as three weeks following treatment.

Aldrin, dieldrin, and lindane —all chlorinated hydrocarbons—had previously been found to kill cattle grubs when injected into cattle, but the recent Kerrville research represents the first successful use of phosphorus insecticides. Yet to be determined are what toxic effect continued use of the chemicals will have on the animals and whether treatments cause accumulation of chemical residues in meat or milk.

Reported results are only preliminary; practical use of these materials is a long way off. The search is still on for a safe treatment to kill grubs before they reach the back of the animal and puncture the skin, to further damage the animals or the meat.

•

Crabgrass Control

Crabgrass control measures on Kentucky bluegrass, Chewings' fescue, and Astorial colonial bent were reported on the basis of tests conducted in 1953 at the University of Rhode Island, Kingston. Liquid chemicals were applied in 10 gallons of water per 1,000 square feet; dusts were applied by hand.

Phenyl mercury acetate (10%), boronium fluoride, and potassium cyanate solutions, activated sludge mixed with potassium cyanate, and potassium cyanate dusts all gave controls of from 92 to 100 percent.

There was no permanent injury to the basic grasses from any of the treatments, and discoloration ranked from least to greatest in the following order: activated sludge-potassium cyanate, phenyl mercury acetate (10%), boronium fluoride, potassium cyanate dust, and potassium cyanate solution. DeFrance and Hart have found that discoloration is most likely to appear when the grass is weak, the temperature very high, or the soil dry. Discoloration is temporary, and the materials are seldom injurious if used as recommended.

For lawn use, phenyl mercury compounds in either liquid or dry form may be applied whenever crabgrass is visible. Best results are obtained when the material is applied before the crabgrass matures. On putting greens these materials can be used as a preventive measure.

The number of applications varies depending on temperature and moisture conditions, but three is usual for lawns and other turf areas; sometimes two will give favorable control. Treatment should be made every 7-10 days or according to manufacturers' directions. Chemicals may be applied at any time during the day. Little or no discoloration occurs when the temperature is below 100° F. J. A. DeFrance and S. W. Hart *Research* R.I. Agricultural Exp. Sta. Spring, 1945, pp. 44-45.

•

Radiation Checks Plant Wilt

A fungus-caused plant disease, fusarium wilt, has been partially checked by the effects of ionizing radiation in experiments conducted by Paul Waggoner, plant pathologist at the Connecticut Agricultural Experiment Station, New Haven, Conn. The work was done under the Station's contract with the Atomic Energy Commission. In other studies using atomic energy, disease control has been brought about by the development of plant mutations. A few of the plants subjected to radiation "mutate" or change genetically in such a way that they become resistant to the disease. This disease resistance can be inherited by the next generation of plants.

In the Connecticut experiments, no such genetic change has occurred. Rather, the effect of radiation in producing disease resistance appears to be a direct one. All of the plants, not just a few mutations, become, to some extent resistant. Very high dosages of X-ray radiation were used. Plants irradiated in the morning were inoculated with the wilt fungus the same afternoon, and all proved to be highly susceptible to the disease.

However, when a low radiation dose was used and disease inoculation delayed until several days after the plants were exposed to radiation, the effect was reversed. Disease resistance was 50 per cent greater than in check plants which received no radiation. With very high dosages and the long time lag between irradiation and inoculation, the plants were almost completely immune to disease. However, the

stunting effect of the high radiation dose was great, while, with smaller dosages, it was negligible.

If Dr. Waggoner's experiments are successful on a larger scale, it might be possible to irradiate farm crops to protect them from wilt disease. With small plants, this could be done quite cheaply and simply. One disease which Dr. Waggoner is hopefully considering from this standpoint is Verticillium wilt of potatoes, a serious disease in this area and one for which no control is now known.

•

Florida Research Report

Florida Agricultural Experiment Station, Gainesville, Fla., in its latest annual report covering fiscal 1953, includes a number of brief progress reports on various research projects resulting in new conclusions regarding use of agricultural chemicals.

In one investigation involving use of cattle sprays for control of horn-flies, lice and ox warbles, it was decided that high sprayer pressures previously thought necessary, "are not as important as the materials used."

A herd of 500 adult cattle and 150 calves were sprayed with a mixture consisting of 8 lbs. of 5 per cent rotenone (wettable powder) and 1 gallon of an oil emulsion concentrate consisting of 1.7 per cent lindane and 42.8 per cent of toxaphene per 100 gals. water. The materials were compatible and gave excellent control with one treatment at 200 lbs. nozzle pressure.

In another trial with 400 head of cows and calves, the spray consisted of toxaphene 40 per cent, wettable, 10 lbs., and rotenone, 5 per cent, wettable, 8 lbs., to 100 gals. water, with the power sprayer operated at 200 lbs. nozzle pressure. This treatment was also effective against the same three pests and the report concludes "Therefore the higher pressures previously thought necessary are not as important as the materials used."

In a report on an investigation of chemical and microbiological aspects of anhydrous ammonia, attention is called to earlier reports that the lateral movement of ammonia from the injection zone is about two inches when ammonia nitrogen is applied at 100 lbs. per acre. Continuing, the report says:

"However, the soil moisture content measurably influences this movement. With low moisture content the ammonia gas encounters less resistance from the soil than at high moisture content. It has generally been considered that retention of ammonia is proportional to the soil moisture content but this does not hold for any sandy soils. Sandy soils retain more ammonia near the point of injection when moisture content is high, but the ammonia does not spread as far."

NEW BOOKS

Index IX to the Literature of American Economic Entomology. 1954. Entomological Society of America. 1530 P Street. N.W., Washington 5, D. C. 528 pp. $3.50.

Covers literature published in 1948-49. A valuable compilation of the literature in the applied field, based on an alphabetical listing of species, subjects and materials. The Index under "Insecticides" alone occupies 43 pages.

Response of Crops and Soils to Fertilizer and Manures, by W. B. Andrews. Second edition. Published by W. B. Andrews, State College, Miss. 458 pp, 6 x 9 inches, cloth binding.

This second edition of a text discussing various fertilizers, use of legumes to supply nitrogen, and use of cyanamid and other sources of nitrogen, contains a full discussion of the use of anhydrous ammonia as an agricultural source of nitrogen. Properties of nitrogenous fertilizer solutions are reviewed as well as the production and use of nitrogenous fertilizers.

Chemical Business Handbook. J. H. Perry, editor-in-chief. Published by McGraw Hill Book Co. 7 x 9 inches, cloth binding, price 17.00.

20 sections covering all major phases of business operations, from financing a business enterprise to advertising and selling its products.

Shelled Corn Protection

Various spray and dust formulations containing synergized pyrethrins, ryania, or lindane were studied for value in protection of shelled corn from insect attack. Insecticides were applied to shelled corn in the fall of 1952, samples taken through December 1953, and the insect populations determined. No insects were found after treatment with a pyrethrins-piperonyl butoxide-talc dust at 100 pounds, or with ryania-*n*-propyl isome dust at 60 pounds per 1,000 bushels. The first formulation caused downgrading of the corn because of the inorganic base.

The insect population was held to a very low level by ryania, ryania-sulfoxide, and ryania-*n*-propyl isome dusts at 45 pounds or lindane-flour dusts at 60 pounds per 1,000 bushels. The ryania-sulfoxide formulation caused downgrading of the corn because of an objectionable odor.

Dusts of pyrethrins-sulfoxide-ground rice hulls and pyrethrins-piperonyl butoxide-corn cob flour at 100 pounds per 1,000 bushels and a spray containing pyrethrins-piperonyl butoxide-water applied at 10 gallons held insect populations to a relatively low level. A spray containing pyrethrins-piperonyl butoxide-carbon tetrachloride and dusts containing lindane-flour applied at 45 pounds and pyrethrins-piperonyl butoxide-corn cob flour at 75 pounds per 1,000 bushels failed to inhibit the development of dangerous insect populations.

Tests in which insects were confined for 3 weeks on samples of grain taken 2, 4, 7, 9, and 11 months after treatment gave results that correlated closely with the populations in the bins.

The moisture content of corn treated with the water-base spray decreased rather than increased in the 3 weeks following application.

Ryania residues remained high after 7 months but were rather variable. Lindane residues after 3 months were only one-thirtieth to one-fortieth of the amounts applied. A. C. Apt, USDA Bulletin E-875, April 1954.

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Fertilizer Requirements in Citrus

AN overall discussion of fertilizer requirements, insect control and disease control in growing citrus is contained in bulletin 258 of the Agricultural Experiment Station, Tucson, Arizona. The 38-page report gives a general background of citrus production, cultivation of cover crops, irrigation, etc. Fertilizer needs of the crop are determined by three methods:

(1) Field fertilizer experiments, (2) leaf analysis, and (3) soil analysis. An experiment in field fertilizer trials in which the different elements were applied in varying amounts and the tree growth and fruiting response in the fifth to seventh year after the experiment started, recorded, indicated that potassium and phosphate did not produce an additional fruiting response over nitrogen alone. One pound of mineral nitrogen, in either the ammonia or nitrate form, was definitely required for trees of this age, but additional amounts failed to show a conclusive response. Manure was definitely a poor source of nitrogen in this soil.

This experiment is considered as specific for the variety, age of tree and soil type involved and not to be interpreted to hold under conditions which are markedly different. Observations upon trees twenty to thirty years old, growing in similar soils, indicate that the high natural fertility eventually is depleted so that at some later period it becomes necessary to begin fertilization.

Field experiments are required to demonstrate fertilizer requirements, but the results tend to be specific for the trees and soil involved in the test. By analyzing leaves from trees in fertilizer tests, information has been obtained about the amout of the various elements present. These values have been correlated with tree responses so that the fertilizer needs of the tree may be determined without a field test.

Leaf analysis of Arizona trees indicates that there are ample amounts of potassium and phosphorus present without fertilization with those elements. Nitrogen fertilization, however, is usually required to maintain a sufficient amount in the tree for maximum fruit production.

Analyses of soils from fertilizer tests have thus far failed to reveal a close relationship between the amounts of available fertilizing elements in the soil and tree response. This apparently is caused by several factors. Citrus tree root systems are deep and wide-spreading so that nutrients are absorbed from a large mass of soil. Nutrients are apparently absorbed throughout the year and some are known to be stored in the tree. Soil analyses reveal that available nitrogen tends to vary throughout the year. Thus, nitrate determinations at any one time are of little value for interpreting the nitrogen requirements. Since the trees do not respond to phosphorus and potassium fertilization, there has been no opportunity to establish minimum values for these elements.

Minor Element Nutrition

ZINC deficiency symptoms are frequently observed in Arizona. Repeated tests with sprays or trunk and soil applications have failed to produce consistent clear-cut responses. In the most severe cases, an excess of boron is associated with the typical zinc mottle pattern. This condition has been corrected only by changing the supply of irrigation water. Manganese and magnesium deficiency patterns have also occurred, but corrective measures to date have not influenced fruit production. Further information is being acquired.

Iron deficiency, or lime induced chlorosis, is prevalent in many groves, particularly those growing in calcareous clay loam soils.

If iron chlorosis is moderate, frequently an application of 20 to 30 pounds of commercial grade iron sulfate applied in twenty to thirty holes 18 inches deep has been found to produce some improvement.

Citrus Insect Control

CITRUS thrips is the chief insect causing damage to citrus in Arizona, requiring annual control measures. Sulfur dust, tartar emetic-sugar sprays, and DDT have been used in the past. DDT is presently used where cottony cushion scale is not present. Sabadilla (Thrip Tox) and dieldrin are currently producing effective control and may be used where cottony cushion scale is present. All control materials should be applied when about 75 per cent of the petals on the south side of the tree have dropped. The amount of each material to use is given in the accompanying table.

In recent years, brown wasps have appeared in the citrus groves, and interfered with picking. This insect can be knocked down and killed by spraying the nests with a "Thanite" spray.

Citrus Disease Control

BECAUSE of the very dry climatic conditions which prevail most of the time in Arizona, only two fungus diseases cause trouble: brown rot gummosis and black rot. For control of brown rot gummosis, the bark and gum in the infected zone is first cut away. Then about 3/8 inch of healthy bark is removed and the entire area is painted with bordeaux paste. The disease can be prevented by removing soil so that the trunk and upper roots near the trunk are exposed to the air.

Spray Materials Per Acre for Citrus Thrips Control

Material	Spray rig	Airplane
DDT	6-8 lb. 50% wettable 200-300 gal. water	5% dust 50 lb.
Dieldrin	½ lb. 200-300 gal. water	½ lb. 10 gal. water
Sabadilla	1½ gal. 10. lb. sugar 200-300 gal. water	not used

Farmer Jones sets a good table

. . . and don't the insects know it!

BETTER CROPS mean mighty good eating for the bugs, too. But now, Shell Chemical provides *aldrin*, *dieldrin* and *endrin* . . . a team of potent insecticides that wipes out most any pest with a yen for crops. Boll weevils, cutworms, grasshoppers, rootworms, ants, hornworms, and a host of other hungry insects are knocked cold . . . above the soil or below.

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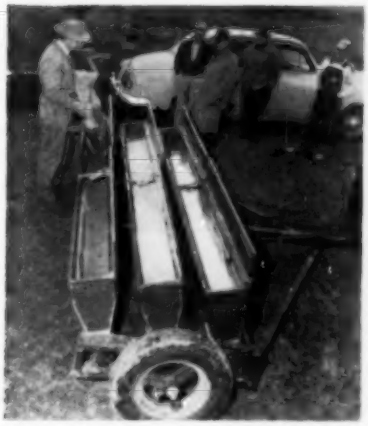

Gandy Fertilizer Spreader

The new Gandy fertilizer spreader which carries three separate 10-foot hoppers on one wheel base, making it literally a "fertilizer mixing plant on wheels," is creating considerable interest among farmers in a number of states where it has recently been demonstrated. By placing three different concentrated fertilizer elements in the hopper and making a quick adjustment in the separately regulated rate of flow from each hopper, the machine, as it is pulled across the field, can put down whatever analysis fertilizer the farmer selects. Each hopper holds 600 to 700 pounds, or a three-hopper total load of around one ton of fertilizer ingredients.

The machine is intended primarily for broadcasting and top dressing with concentrated fertilizer materials. By a quick adjustment of the rotor bars in a hopper's bottom it can also be used as a seeder or combination spreader-seeder with which grain or as little as 2 pounds per acre of grass seed can be sown and fertilizer put down with it in one trip across the field. All-steel welded construction is used for heavy duty service, while for highway travel there is a clutch which throws the spreader parts out of gear.

The 3-hopper Gandy Spreader is being manufactured by E. S. Gandrud Co., Minn., on designs developed by engineers of Southern States Cooperative, Richmond, Va., which first announced the new development early this year. Since then distribution has been extended through regional farmer cooperatives in Indiana, Pennsylvania, New York and other states.

•

Automatic Blending Process

Richardson Scale Co., Clifton, N. J. has developed a new remote weight-control system for blending additives with process material continuously and accurately. Products which may be handled include chemicals, fertilizers, insecticides, etc. Advantages for the Richardson blending system are said to be rigid process control, immediate start-up, quick formula changing, precise weighing of additives, and operation over a wide range of weight ratios.

•

New Lessmann Loader

Lessmann Manufacturing Co., Des Moines, Iowa, has just announced the addition of a new model to its line of loading equipment. The new Lessmann GFT model has front wheel drive and rear wheel steering which gives it particular advantages for those users who are confronted with the problems of operating in confined areas. Bucket is 22 cu. ft. struck capacity, 28 cu. ft. heaped. Bulletin # 74 giving full details on the new model is available on request.

•

Baughman Equipment Catalog

Baughman Mfg. Co., Jerseyville, Ill. recently issued a two-color, eight-page catalog which fully describes their line of fertilizer and lime spreaders. The following models are described in the catalog: K4B Belt Discharge Spreader; K4C Chain Discharge Spreader; K4CO or K4BO Orchard and Grove Body; K4S Split Drive Spreader and KMS Mud Body Spreader. The Orchard and Grove Body Spreader has an adjustable distributor, which can be dropped about 12 inches, so that fertilizer can be spread in under trees.

Fertilizer Metering Attachment

Highway Equipment Co., Cedar Rapids, Iowa, has introduced a new metering attachment for use with their "New Leader" fertilizer and lime spreaders. The attachment eliminates much of the guesswork in fertilizer application because it enables the operator to determine proper feedgate opening for any given output per acre without waste of material. The amount of material to be spread per acre can be easily and quickly determined before any spreading is done in the field, assuring the user a uniform application of just the right amount per acre.

The metering attachment fits all late model "New Leader" twin disc spreaders. Further information is available on request.

New Transvair Bulletin

The Young Machinery Company, Muncy, Pa., announce the release of a four page bulletin covering their "Transvair" pneumatic conveying system. The bulletin illustrates and describes a "Transvair" installation handling a 350 mesh material without dust losses or the need for filter type collectors or wet scrubbers. On dry, free flowing materials the system is said to be dust tight and self cleaning.

Applications for "Transvair" are given and the Young Machinery Company claims numerous cost advantages over mechanical systems.

The bulletin further offers a complete pilot plant "Transvair" system for testing customer's products. This experimental system may operate on a continuous or batch basis and will handle approximately 500 pounds per hour of materials ranging in particle size from 4 to 400 mesh.

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The accepted standard for all other diluents.

SUPREX CLAY
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Spencer Ammonia Book

"Ammonia," a 50-page book on the technical aspects of handling, physical properties and allied topics, has just been released by Spencer Chemical Co., Kansas City.

The book, containing 47 halftones and drawings and 17 charts and graphs, is concerned with both anhydrous and aqua ammonia. In detail it discusses uses, handling, safety, and properties.

The book takes 12 pages to chart vapor pressure, specific volume and density, thermal properties, solubility and integral heat of solution of anhydrous ammonia, and density and total vapor pressure of aqua ammonia. Although the book is primarily for technical use, it also contains background information on the history and uses of ammonia.

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Seed Treatment Film

Panogen, Inc., Ringwood, Ill., have recently produced a color film on the story of seed treating. Most of the scenes were photographed in Sweden, and illustrate how treating seed wheat with a liquid disinfectant prevents fungus growths that cause smut and blight.

•

Potash Mailing Folder

A mailing folder dealing with potash and its agricultural uses has been issued by American Potash & Chemical Corp., Los Angeles, as part of its "Profit Plugs" sales promotion campaign.

Based on the theme that "potash gives bumper crop insurance," the folder points out that potash, as one of the three basic plant foods, is necessary to profitable production of crops. The folders will be mailed to farmers and agricultural chemicals jobbers.

•

Defoliating Booklet

Publication of a new booklet, "Defoilate Cotton with a Cyanamid Spray or Dust," has been announced by the Agricultural Chemicals Division of the American Cyanamid Company. It lists the properties and proper use of Cyanamid's defoliating materials.

Transparent Bags Offered

Transparent and translucent film gusset bags without bottom or center seams are distributed by Geveke & Co., New York City, and suggested for use in food and chemical industries. The bags are said to be virtually sift-proof.

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Bulletin on Wood Treatment

A U. S. Department of Agriculture Forest Service Booklet, "How To Treat Fence Posts by Double Diffusion," is being offered by Mutual Chemical Company of America, manufacturer of chromium chemicals. This method, designed to combat decay and termites, was developed at the Forest Products Laboratory in cooperation with the University of Wisconsin.

Sodium chromate and copper sulphate are the chemicals required for the 'double diffusion' process. Very little equipment is needed and the method is simple, effective, and economical.

•

Rohm & Haas Bulletin

Rohm & Haas Co., Philadelphia, have issued a bulletin on the properties, uses and chemical reactions of "Octylphenol and Nonylphenol."

•

Anhydrous Ammonia Hose

The United States Rubber Co., New York, has developed an ammonia hose with a working pressure of 400 pounds per square inch that can withstand the low temperatures caused by ammonia vaporization. It is intended for use in the transfer of the ammonia under pressure from bulk storage tanks to the dispensing unit and from there to the soil several inches below the surface.

The hose is reinforced with wire braid and has a synthetic rubber tube that is resistant to oil and low temperatures. The cover is of neoprene, perforated to allow safe dissipation of ammonia vapors. Called U. S. Agra Wire Braid Ammonia Hose, it comes in sizes ½ to 1½ inches in diameter.

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Field Trial Booklet

Dr. G. R. Townsend, Belle Glade Florida, has recently issued a 12-page booklet describing the services of Florida Field Trials in screening new chemicals before they are placed in company trials, or submitted to public institutions for testing. The booklet details the procedures used in testing, the types of equipment used, material requirements, etc. It reviews also horticultural tests, herbicide trials, soil treatment trials and seed treatment tests.

Booklet Describes Miticide

A descriptive booklet concerning the use of Estonmite-50W for control of spider mites in agricultural and ornamental crops has been issued by the Agricultural Chemicals (Eston Chemicals) Division of American Potash & Chemical Corp., Los Angeles.

Estonmite-50W, based on the active ingredient p-chlorophenyl p-chlorobenzene sulfonate, destroys many species of mites principally by killing mite eggs. It is said to have no harmful effects on predators.

The booklet describes Estonmite-50W as "a wettable powder formulation, dustless, non-abrasive, rapidly wettable with excellent suspension and spreading characteristics."

NEVSOLV 200

Boiling Range	195°C (383°F) to 288°C (536°F)
Specific Gravity	.886 to .915
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Boiling Range	130°C (266°F) to 190°C (374°F)
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These NEVSOLVS are active solvents for DDT, BHC, 2-4-D esters, etc., and are especially clean with good odor.

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New Trademarks

AM SOL, in capitals, for chemical weed killer. Filed Jan. 15, 1954, by Food Machinery and Chemical Corp., San Jose, Cal. Claims use since April 7, 1948.

ESTA SOL, for chemical weed killer. Filed Jan. 15, 1954, by Food Machinery and Chemical Corp., San Jose, Cal. Claims use since March 1, 1949.

F.I.C.S., for composition in the form of a powder containing carbohydrate material or a mixture of carbohydrate and protein material for conditioning water in the soil so that the water will hold such material in colloidal suspension in which state the carbohydrate or mixture of carbohydrate and protein may be readily assimilated by plants. Filed June 22, 1953 by Charles T. Fuetterer, Cuyahoga Falls, O. Claims use since April 1, 1953.

"RAISES THE DEVIL WITH WEEDS," with drawing of the devil, for weed killer. Spencer Chemical Co., Kansas City, Mo. SN 642,704. Claims use since Feb. 7, 1953.

ALPHENOL, in capitals, for chemical defoliant or dessicant, for plants such as cotton, soybean, corn, alfalfa, clover and potato vines. Filed Oct. 8, 1953, by J. Newton Hall, doing business as Pioneer Chemical Associates, Denver, Col. Claims use since Aug. 20, 1953.

TOXANE, in open letters, for insecticide use on livestock. Filed Aug. 11, 1953, by Cotton States Chemical Co., Inc., West Monroe, La. Claims use since July, 1952.

EVCO, in capitals, for grain fumigants and rodenticides. Filed Jan. 8, 1954, by John D. Evans, doing business as John B. Evans Co., Kansas City, Kan. Claims use since July 31, 1953.

VERONEX, in capitals, except for second "e" in small letter, for plant growth aid. Filed Jan. 26, 1954, by Hydroponic Chemical Co., Copley, O. Use since prior to January, 1954.

BRIMM, in capitals and lower case, for plant food. Filed Jan. 27, 1954, by Swift & Co., Chicago. Use since on or about Aug. 22, 1944.

RED DEVIL, with drawing of devil, for dry weed killer. Filed June 15, 1953, by Marine, Electrolysis Eliminator Co., Seattle, Wash. Use since April 1, 1947.

DRAWING of a horse leaping against a background of a sun, for expanded vermiculite for use as a soil builder and conditioner and for other horticultural purposes. Filed Jan. 28, 1953, by American Vermiculite Corp., New York, N. Y. Use since May 20, 1952.

GLITTER, in multicolored letters, for same as previous trademark. Filed Jan. 28, 1953, by American Vermiculite Corp., New York, N. Y. Use since June 10, 1952.

TRUE RIPENER, in script and capitals, for fertilizers. Filed May 15, 1953, by Smith-Douglass Co., Inc., Norfolk, Va. Use since Sept. 26, 1936.

SWALLOW BRAND, in capitals with a drawing of a swallow, for fertilizers and chemical fertilizers. Filed July 8, 1953, by Toyo Koatsu Industries Inc., Tokyo, Japan. Use since on or about July 25, 1950.

LIQUID GOLD, in gold letters, with word "liquid" disclaimed apart, for liquid fertilizer. Filed Aug. 20, 1953, by Farm Chemicals Co., Homestead, Pa. Use since on or about July 1, 1953.

SOILCON, in capitals, for commercial fertilizer composed of an agricultural soil amendment containing predominantly pyrrohotite mineral and silicon. Filed Oct. 28, 1953, by Yucca Mining and Milling Co., Inc., Douglas, Ariz. Use since Mar. 2, 1953.

ORGANI-GREEN, in script, underlined, for fertilizer. Filed Jan. 25, 1954, by Lawn-Tex, Inc., Chicago, Ill. Use on or about April 1, 1952.

INDUSTRY *Patents*

The information below is furnished by patent law offices of

LANCASTER, ALLWINE & ROMMEL

402 Bowen Building
Washington 5, D. C.

The data listed below is only a brief review of recently issued pertinent patents obtained by various U. S. Patent office registered attorneys for manufacturers and/or inventors. Complete copies may be obtained direct from Lancaster, Allwine & Rommell by sending 50c for each copy desired. $1.00 for Canada. They will be pleased to give you free preliminary patent advice.

2,679,457. PASTEURIZING DRIED UNCURED FISH MEAL. Patent issued May 25, 1953 to Paul A. Shaw, Anaheim, Cal. A process for pasteurizing dried uncured fish meal and reducing its tendency to scorch and deteriorate through spontaneous combustion which comprises forcing air through a mass of the fish meal while maintaining its temperature in a range of about 140° F. to about 165° F. such that contained mold spores are killed but no substantial discoloration due to scorching occurs, the air being forced through the mass for a period of about 15 to about 90 minutes.

2,683,075. DIGESTION OF PHOSPHATE ROCK. Patent issued July 6, 1954, to Paul Caldwell, Evergreen Park, Ill., assignor, by mesne assignment to Cannac Research and Development Company, Thornwood, N. Y. The method of recovering a substantially non-hygroscopic calcium phosphate product from phosphate rock containing calcium phosphate which comprises dissolving the phosphorus component of the rock in an inorganic nitrogenous acid with the resulting formation of an acidic aqueous phase containing substantially all of the acid-solubilized calcium and phosphorus components of the rock in the form of calcium nitrate and phosphoric acid; adding to said calcium- and phosphorus-containing aqueous phase an alkali metal salt of the group consisting of potassium chloride, sodium chloride and sodium sulfate in an amount such that, in addition to the amount thereof consumed by the resulting precipitation of a substantial portion of any acid soluble fluorine component of the rock in the form of an insoluble alkali metal fluosilicate, there will be further incorporated in said aqueous phase an amount of the alkali metal salt at least substantially equivalent stoichiometrically to the calcium nitrate content of said aqueous phase; and after addition of said amount of the alkali metal salt adding ammonia to the alkali metal salt-containing aqueous phase, thus precipitating therefrom the aforesaid dissolved calcium and phosphorus components of the rock in the form of a substantially non-hygroscopic calcium phosphate product.

2,683,698. PLANT NUTRIENT COMPOSITION CONTAINING ZINC AND PROCESS OF PRODUCING THE SAME. Patent issued July 13, 1954, to Harold F. Saunders, Cleveland, Ohio, and Fredric C. Verduin, Chicago, Ill., assignors to The Sherwin-Williams Co., Cleveland, O., a corporation of Ohio. The method of making a zinc-containing composition suitable for use as a plant nutrient composition which comprises the steps of blending a zinc oxide-containing material with a mont-morillonite clay, co-milling said blend to produce an interspersion of substantially deaggregated particles of said zinc oxide-containing material and said montmorillonite clay, and introducing a minor amount of a deflocculating agent, whereby a substantially water-insoluble, readily and stably water dispersible composition is produced.

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Celatom is also an excellent carrier for toxicants such as Malathion . . . as a diluent for many types of insecticides . . . as an absorbent for chemicals that control seed diseases . . . scores of other applications. Celatom's flow quality, high bulk and other properties give a more effective and uniform "spread" . . . do not reduce the toxic action of the "kill."

Write for samples and for laboratory assistance. No obligation, of course.

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General Offices: Cincinnati (1), Ohio

2,680,679. MANUFACTURE OF FERTILIZERS. Patent issued June 8, 1954, to Edward W. Harvey, Highland Park, and George L. Frear, Neshanic, N. J., assignors to Allied Chemical & Dye Corporation, New York, N. Y., a corporation of New York. A continuous process for preparing a nitrogen-phosphate base fertilizer, which comprises reacting phosphate rock composed essentially of particles of a size capable of passing a 100 mesh sieve, with an aqueous acid medium containing at least about 2 equivalents of H_2SO_4 for each 3 equivalents of any other acid for a period of about 5-10 minutes to convert substantially the entire phosphate content of the rock to H_3PO_4, the total amount of acid being at least 33% in excess of that theoretically required to effect such conversion to H_3PO_4, and the water content of the reaction mixture being 8 to 120 parts per 100 parts of phosphate rock, subjecting the resulting slurry comprising $CaSO_4$, H_3PO_4 and excess acid without any previous curing step, to reaction with ammonia in an amount of 6-8 mols per 10 equivalents of acid employed in acidulation, for a time sufficient to convert said H_3PO_4 essentially to dicalcium phosphate and ammonium phosphates, the ammoniation reaction reaching a maximum temperature of 25-180° C., recovering a fluid to plastic mass of material, drying and granulating said material, and obtaining as product a uniform, stable, free-flowing, granular fertilizer composition containing dicalcium phosphate, ammonium phosphates and ammonium sulfate.

2,680,680. PRODUCTION OF COMPLETE FERTILIZERS. Patent issued June 8, 1954, to Gordon A. Coleman, Petersburg,, Va., assignor to Allied Chemical & Dye Corporation, New York, N. Y., a corporation of New York. A process for preparing fertilizers which comprises the following steps: step 1, treating phosphate rock with a mixed acid containing nitric acid and at least one acid from the group consisting of sulfuric and phosphoric acids in the proportions of from about 7 to about 20 equivalents of mixed acid per mol of P_2O_5 in the phosphate rock, said mixed acid containing nitric acid in amount of from about 40% to about 80% of the acid equivalents, the acidulation of the rock being carried out in the presence of water amounting to from about 15% to about 40% by weight of the total mixture; step 2, ammoniating the acidulated material employing from about 0.6 to about 0.8 mol of ammonia per equivalent of acid and sufficient water so that the ammoniated material leaving the ammoniation treament contains from about 15% to about 30% by weight of water and incorporating a potassium salt in amount to produce a final product containing from about 7% to about 20% by weight of K_2O; step 3, mixing the material from step 2 with a portion of the dry product from step 4 to produce a mixture containing from about 15% to about 45% by weight of liquid at a temperature of from about 60° to about 80° C.; and step 4, drying the resultant mixture to produce a fertilizer containing not more than about 2% by weight of moisture and withdrawing as product dried mixture not passed to step 3.

2,681,879. CARBAMIC ACID ESTERS AS WELL AS PEST COMBATTING AGENTS AND A METHOD OF MAKING THE SAME. Patent issued June 22, 1954, to Hans Gysin, Alfred Margot, and Charles Simon, Basel, Switzerland, assignors to J. R. Geigy A. G. Basel, Switzerland, a Swiss firm. As a new chemical compound, 2,6-dimethyl-pyridyl-(4)-dimethyl carbamate.

2,681,853. PLANT GROWTH REGULATION. Patent issued June 22, 1954, to Nathaniel Tischler, Palmyra, N. J., assignor to Sharples Chemicals Inc., a corporation of Delaware. A plant response composition comprising a compound which when in the presence of water yields anions of an acid of the group consisting of 3,6-endoxo-1,2,3,6-tetrahydro-orthophthalic acid and 3,6-endoxohexahydro-orthophthalic acid, and a salt of persulfuric acid with at least one of the group consisting of sodium, potassium, and ammonia.

2,681,878. INSECT REPELLENT COMPOSITIONS. Patent issued June 22, 1954, to Toivo A. Kauppi, Midland, Mich., assignor to Dow Corning Corporation, Midland, Mich., a corporation of Michigan. A composition of matter comprising a non-toxic insect-repellent compound and an organic solvent soluble organopolysiloxane of the formula

$$R_xSiO_{\frac{4-x}{2}}$$

where R is selected from the group consisting of monovalent hydrocarbon radicals and chlorophenyl radicals and x has an average value from 1 to 3, inclusive, said siloxane being present in amount of at least 2 per cent by weight based on the weight of the insect-repellent compound.

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It's important for American Cyanamid to hold down breakage and handling costs in the shipment of samples — both liquid and solid. That's where Harcord paper canisters play a big part. Tailormade shipping canisters provide a cushioning berth for glass containers... and keep costs down.

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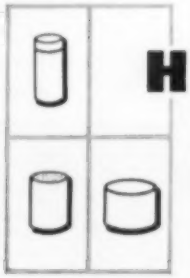

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INDUSTRY *News*

Canadian Assoc. to Meet

Arthur H. Carter, president of the Canadian Agricultural Chemicals Association, announced recently that the Association's second annual meeting and conference will be held at the Seigniory Club, Montebello, Quebec, on October 28th and 29th, 1954. Formed originally by ten companies, the membership has increased to thirty-one manufacturers.

•

Velsicol Appoints Middleton

J. P. Middleton has been appointed administrative assistant at the Memphis plant of Velsicol Corp., Chicago. Mr. Middleton, who formerly was production superintendent of Velsicol's insecticide manufacturing, will now assist in co-ordinating the varied activities of the Memphis plant.

•

Simplot Appoints Kilbourne

J. R. Simplot Co., last month announced the appointment of W. Grant Kilbourne, vice president, to the position of general manager of the fertilizer division. Mr. Kilbourne will direct production, mining, sales etc. with headquarters in Pocatello, Ida.

•

Robert T. Vanderbilt Dies

Robert T. Vanderbilt, 69, president of R. T. Vanderbilt Co., Inc., New York, died August 13th in Bellevue Hospital, New York, from injuries suffered when hit by a truck as he was crosing Lexington Ave., at 43rd St., New York. He is survived by his three sons, Frederick B., Robert T. Jr., and Hugh Vanderbilt, and one sister, Mrs. Robert Hodgson.

•

United Appoints Collins

H. K. Collins was recently appointed to cover the Southern San Joaquin Valley of California for the United Chemical Co., distributors of farm chemicals in the five Western States.

Mr. Collins has spent several years in Southern California in agricultural pest control, and was formerly a president of the California Fumigators Association.

•

New IMC Personnel

The feed ingredients department of International Minerals & Chemical Corporation's Phosphate Chemicals Division appointed three new sales agents last month. R. D. Erwin of R. D. Erwin Co. with headquarters in Nashville will service western Tennessee, Kentucky and northern Alabama. William F. Smith of the Smith Grain Co., Limestone, Tennessee, will cover eastern Tennessee, the Carolinas and southwestern Virginia, and J. A. Lacour, Jr. of Standard Sales Co., in Meridian, Mississippi, will operate in the state of Mississippi and the southeastern portion of Louisiana.

•

Food Machinery Profit Up

Food Machinery and Chemical Corporation reports net income of $6,576,361 for the year concluded June 30, 1954. This compares with $6,288,920 the previous fiscal year.

Pitts. Coke Moves in Atlanta

The Agricultural Chemical Division of Pittsburgh Coke & Chemical Co. recently moved its Atlanta office to a new location at 972 Peachtree St., N. E. The new phone number is Elgin 0709.

•

R. U. Haslanger Joins Stauffer

Stauffer Chemical Co., New York, announced last month the appointment of Robert U. Haslanger to the administrative Staff. Formerly general manager of sales of the Texas Division, Monsanto Chemical Co. Mr. Haslanger was more recently Director of Sales of its Plastics Division.

•

New Mexican Sulfur Sources

New sulfur plants near Jaltipan, Mexico, on the Isthmus of Tehuantepec may shortly be contributing a million tons a year to the world sulfur output. One plant is already in operation, a second larger plant is nearing completion and construction of a third has just been started. Pan American Sulphur Co. is reported already considering expansion of a plant that is not yet completed. A note of caution on the Mexican sulfur venture was sounded however by Fred M. Nelson, president of Texas Gulf Sulphur Co., who was quoted in the *Wall Street Journal*, August 9, as saying: "There are no sure bets in mining." It was suggested that the Tehuantepec operations are still somewhat speculative, and that "only time will tell whether the deposits can be mined at a profit."

CSC Names McConnell

M. K. McConnell recently joined the Agricultural Chemicals Sales Department, of Commercial Solvents Corporation, N. Y. From CSC's offices at Sterlington, Louisiana, Mr. McConnell will handle the sale and distribution of ammonium nitrate to the fetrilizer trade in Louisiana, Mississippi, Arkansas and Texas.

•

Atlas Staff Changes

Atlas Powder Co., Wilmington, Del., early this month announced two changes in the sales staff of the company's chemicals department. Arthur G. Heinel, formerly in charge of the Atlanta office, has been appointed technical representative in charge of a new sub-office in Richmond, Va. He was succeeded in Atlanta by Adrian J. Stewart. Mr. Heinel will represent Atlas in Virginia, Washington, D. C., the eastern half of West Virginia and North Carolina.

•

Sprayer Assn. Elects Houser

Philip L. Houser of Root-Lowell Manufacturing Co., Chicago, was reelected President of National Sprayer & Duster Assn., at the annual meeting held recently at Port Clinton, Ohio. The association held a joint dinner meeting with members of the Power Sprayer Division of Farm Equipment Institute. Prof. A. J. Ohlrogge of Purdue University addressed the group, discussing the application of liquid fertilizer.

•

Mathieson Supplies Ark. Coop

The Mathieson Chemical Co., Baltimore, is supplying fertilizers to the Arkansas Farmers Association for distribution under its own trade name of "Arkansas Farmers Quality" through the association; 54 self-controlled county cooperatives with 62 stores. The association's former contract with the Arkansas Farmers Food Co. for fertilizer supplies was terminated by the latter organization July 15. Total fertilizer sales made through the association last year were about $2,624,000. This is the first time Mathieson Chemical Company has served as a manufacturer for another brand name of fertilizer.

•

Am. Potash Package Change

The redesigning of packages for American Potash & Chemical Corporation products—first announced last April for four major heavy chemicals—has been completed for the entire line of 21 products manufactured by the company.

The new design marks the first basic change in the packaging of American Potash & Chemical Corporation products in 35 years. Several chemicals produced by the company have been packaged in containers bearing the same design since World War I. As new products were introduced in following years, they were packaged in the same-type containers. First announcement of the change was made in connection with the company's four major heavy chemicals, potash, salt cake, soda ash and borax. The completed changeover now includes "Tronabor," "Pyrobor," "Borotherm," boric acid, bromine, lithium carbonate, sulfate of potash, muriate of potash and all other company products.

•

Dow Builds Biochem Lab.

A new laboratory to house its Biochemical Research Department is being built by Dow Chemical Co. at Midland, Mich. When completed in about a year the laboratory will provide 40,000 feet of space for the five sections of the department: toxicology, industrial hygiene, microbiology, basic biochemical and wood laboratories. Dow's Biochemical Research Department works closely with the company's agricultural chemicals group in development, use and safe handling of fumigants, pecticides, weed killers and other agricultural chemical products.

•

London Society Elects

The Fertilizer Society, London, England, recently elected J. T. Procter president and R. Stewart vice president, at a meeting held in Norwich.

Vulcan Names Hoover

Vulcan Stamping & Mfg. Co. and Vulcan Tin Can Co., Bellwood, Ill., have named Donald R. Hoover as a new sales representative in the Chicago area. Mr. Hoover is a graduate of Michigan State University. He recently completed three years of Army service which he concluded with the rank of First Lieutenant in the Quartermaster Division.

•

APFC Sponsors Tour

Editors of 17 farm magazines last month were guests of the American Plant Food Council, on a four-state tour of land grant colleges where they visited experimental farms and plots and heard progress reports on agricultural research in the field of sound land management. The tour covered the University of Wisconsin, Madison, Wisc., Delta Branch Experiment Sta., Stoneville, Miss., North Carolina State College, Raleigh, N. C., and Rutgers University, New Brunswick, N. J.

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Potato Assoc. Award

Dr. Donald Folsom, head of the Department of Plant Pathology at the University of Maine and a member of the staff of the Maine Agricultural Experiment Station was presented with an honorary life membership in the Potato Association of America, at the annual meeting of the Association, August 24-28, in Estes Park, Colo.

Dr. Folsom's life membership in the Potato Association of America is an honor extended to only 14 men since the inception of the award in 1947.

•

CFA Fertilizer Handbook

California Fertilizer Association, 475 Huntington Drive, San Marino, Calif., will shortly publish the second edition of its Western Fertilizer Handbook. The 160 page text will be available at $1.00 per copy. The first edition of 15,000 copies was published in September, 1953, but the stock was completely exhausted, making printing of a second edition necessary.

Dedicate Kansas N Plant

The big new nitrogen plant at Lawrence, Kansas, built by the Cooperative Farm Chemicals Association, was scheduled to be dedicated August 31, with preparations being made to accomodate a crowd of 20,000 at the dedication ceremonies. The first finished products from ammonium nitrate facilities of the plant, and the first carload shipment to Gordon Cooperative Oil & Service Assn., Gordon, Neb., were expected to take place earlier in the month.

Robert B. Tootell, governor of the Farm Credit Association, in Washington, was to be one of the principal speakers on the dedication program, which was to be conducted at Haskell Indian Institute, a short distance west of the new plant.

Other speakers were to include Charles Baker, secretary-manager of Pacific Supply Cooperative, Walla Walla, Wash., and Howard A. Cowden, president and general manager of Consumers Cooperative Association and president of Cooperative Farm Chemicals Association, the CCA subsidiary through which the nitrogen plant has been built.

•

Ohio Pesticide Tour Held

The annual Pesticide Tour conducted by the Ohio Pesticide Institute in collaboration with the Ohio Agricultural Experiment Station, Wooster, Ohio, was held August 10-12. In the course of the tour the group visited a number of farms in the area and got a first-hand view of various insect and disease control problems on corn, turf, vegetables, legumes, fruits, etc. J. D. Zimmerman, Diamond Fertilizer Co., Sandusky, is president of the Ohio Pesticide Institute, and J. D. Wilson of the Ohio Experiment Station is secretary.

Addresses observing the one hundred years of entomology were given by L. L. Rummell of the Ohio Experiment Station, and by D. G. Hall, of the U.S.D.A.

•

Pitts. Coke Personnel Changes

Several appointments and transfers in the territorial sales personnel of the Agricultural Chemicals Division of Pittsburgh Coke & Chemical Company have been announced by W. Scott James, division sales manager.

Four district managers have been appointed: Hugh Swink of the Dallas Office is now in charge of the Southern cotton belt area; A. J. Franz of the St. Louis Office, the Mid-Central states; A. H. Carnes of the Chicago Office, the North Central and Eastern states; and T. G. Lewton, Jr. of the San Francisco office, the Western states.

C. Howard Elmer has been transferred from the division's Charlotte, North Carolina office to the Pittsburgh office, where he will serve as sales representative out of Pittsburgh. S. F. Stewart of the St. Louis office has been transferred to Omaha, Nebraska.

D. M. Dudley of the Dallas office is now located in Lubbock, Texas, and Russell W. McCalley, formerly located in Pittsburgh, will now headquarter in Los Angeles.

A. H. CARNES

T. G. LEWTON

H. SWINK

A. J. FRANZ

Meeting Calendar

Sept. 6 — National Joint Committee on Fertilizer Application and American Society for Horticultural Science, University of Florida, Gainesville.

Sept. 8-10 — National Agricultural Chemicals Association, Spring Lake, N. J.

Sept. 16-17—American Chemical Society, Division of Fertilizer and Soils, New York.

Oct. 18-21—National Pest Control Association, annual convention, Hotel Di Lido, Miami Beach.

Sept. 19-22—Western States Garden Supply Show, Exposition Building, Oakland, Cal.

Sept. 21—Field Day, University of Minnesota Agricultural Experiment Station, Rosemont, Minn.

Oct. 6-7—Fifth Annual Convention, Pacific Northwest Plant Food Association, Sun Valley, Ida.

Oct. 11-13 — Association of Official Agricultural Chemists, Inc., Shoreham Hotel, Washington, D. C.

Oct. 12-15—8th National Chemical Exposition, Chicago Coliseum.

Oct. 13-14—Association of American Feed Control Officials, Shoreham, Washington, D. C.

Oct. 14-15—Society of Agricultural Engineers, Pacific Northwest Section, Davenport Hotel, Spokane.

Oct. 15—Association of American Fertilizer Control Officials, Shoreham Hotel, Washington, D. C.

Oct. 16 — Association of Economic Poison Control Officials, Shoreham Hotel, Washington, D. C.

Oct. 18-19—Fertilizer Section, NSC, Chicago, Ill.

Oct. 26-27 — Annual Washington State College Dusting and Spraying Conference, Chinook Hotel, Yakima, Wash.

Nov. 3-4—South Carolina Annual Fertilizer Meeting, Clemson College, Clemson, S.C.

Nov. 8-12—American Society of Agronomy, St. Paul Hotel, St. Paul, Minn.

Nov. 9-11—16th Annual New York State Insecticide-Fungicide Conference, Ithaca, N. Y.

Nov. 10-12—National Fertilizer Assoc., Hollywood Beach Hotel, Hollywood, Fla.

Nov. 15-16—Eastern Branch, E.S.A., Hotel New Yorker, New York City.

Nov. 15-16—California Fertilizer Association, del Coronado Hotel, Coronado, Cal.

Nov. 18-19—South Carolina Accident Prevention Conference, Fertilizer Section, Spartansburg, S. C.

Dec. 2-3 — Beltwide Cotton Insect Control Conference, Adolphus Hotel, Dallas, Tex.

Dec. 5-8—Agricultural Ammonia Institute, Jung Hotel, New Orleans.

Dec. 6-9—Entomological Society of America, annual meeting, Houston, Tex.

Jan. 9-12, 1955—Middle States Garden Supply Show, Hotel Sherman, Chicago.

Jan. 31-Feb. 3, 1955—Eastern States Garden Suply Show, 71st Infantry Regiment Armory, New York.

Fairfield Division Takes Over U. S. I. Operations

JOHN RODDA

RUSSELL B. STODDARD

PRODUCTION of insecticides in Baltimore was started Sept. 1 by the new Fairfield Chemical Division of Food Machinery and Chemical Corp.

Ernest M. Hart, executive vice president in charge of chemical operations, said the Fairfield division will embrace the insecticide business and related production and laboratory facilities recently bought by Food Machinery from U. S. Industrial Chemicals Co., Division of National Distillers Products Corp.

Russell B. Stoddard and John A. Rodda will head the division. Mr. Stoddard, who served as coordinator of insecticide operations for USI, is manager and Mr. Rodda is sales manager. Both have offices at 420 Lexington Ave., New York.

Mr. Hart explained at a press conference in the Hotel Biltmore, August 24th, that the Fairfield division will continue to manufacture the products and maintain the policies, established by USI, with initial emphasis on pyrethrum, Pyrenone, allethrin and related products. He said herbicide activities will be intensified and ample research and production facilities will be available for broad expansion toward development of other products.

Fairfield will continue to serve as suppliers of raw materials and will not enter the field of consumer products.

Other officers include W. S. Blondheim, plant manager in charge of operations other than sales and research, and Dr. Herman Wachs, in charge of research. Many other personnel are being retained.

Texas Fertilizer Grades

The Texas Fertilizer Committee announced recently the following list of fertilizer ratios and grades approved for sale in the State of Texas during the year beginning September 1, 1954.

Ratio	Minimum Grade	Ratio	Minimum Grade
0-1-1	0-14-14	1-2-3	4-8-12
0-2-1	0-16-8	1-3-1	4-12-4
1-1-0	10-10-0	1-3-6	3-9-18
1-1-1	8-8-8	1-4-4	3-12-12
1-2-0	7-14-0	2-1-0	14-7-0
1-2-1	5-10-5	2-2-1	10-10-5
1-2-2	5-10-10	3-4-6	6-8-12

In the above list a number of changes, increases and deletions, have been made from last year's approved list as follows:

1. The minimum grades in the 0-1-1 and 0-2-1 ratios have been increased.

2. The 2-1-1 (10-5-5) and 3-5-2 (6-10-4) ratios have been removed from the list approved for general agricultural use, but may be approved as specialties if properly labelled as such.

3. The following ratios are no longer approved, since the tonnage sold was extremely low and they closely approximate other approved ratios:

1-3-2	(4-12-8)
3-1-0	(15-5-0)
3-2-0	(12-8-0)
3-3-1	(12-12-14)

Announcement of the new approved list was made by J. F. Fudge, state chemist. He advises that the next meeting of the Southwestern Fertilizer Conference and Grade Hearing will be held at the Buccaneer Hotel, Galveston, Texas, July 15, 1955. S. M. Hackett will act as chairman of the committee on arrangements for the 1955 meeting.

•

Starr Leaves Penick

Donald Starr, chief chemist of the insecticide department of S. B. Penick & Co., New York, left the company September 1st, and will establish a consulting practice. Mr. Starr had been with the Penick organization for nine years, and prior to that was connected with the Bureau of Entomology and Plant Quarantine, U.S.D.A.

•

Spencer Names Culpepper V.P.

See Story on page 124.

at right J. E. Culpepper newly elective vice president

Maine Blight Spreads

Late Blight in Maine potato fields has become very serious and is spreading rapidly, according to a recent announcement by agriculture commissioner, Fred J. Nutter. A visit to the fields of Aroostock county, Me., showed that nearly all fields had some infestation, and about one-third are in serious condition.

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New Grain Pest In 3 States

The Khapra beetle, an insect unknown on this continent until last November, has been found infesting grain warehouses in 12 counties in California, Arizona, and New Mexico, reports the U. S. Department of Agriculture. USDA entomologists say

Pennsalt Advances Whinfrey

Appointment of C. G. Whinfrey as Northern sales manager for agricultural chemicals has been announced by Fred C. Shanaman, president of Pennsylvania Salt Manufacturing Company of Washington, Tacoma, Washington.

Mr. Whinfrey has been with Penn Salt since 1948. He served with the Philadelphia sales office, later as agricultural chemicals sales representative in the Northeastern States, and recently as sales supervisor for the 37 Eastern States. In his new position, Mr. Whinfrey will be responsible for the sales of "Penco" agricultural chemicals products in the 26 northern states including the area from Kansas to North Dakota and the states Eastward to the Atlantic Coast. He is a graduate of Cornell University and a U. S. Navy Veteran. Mr. Whinfrey's headquarters will be in Philadelphia.

At the same time, it was announced that Edward O. Fall has joined Mr. Whinfrey's sales staff. Mr. Fall will serve as sales representative for "Penco" agricultural chemicals in New England, New York, northern New Jersey and Pennsylvania. Mr. Fall has been associated for several years with Rogers and Hubbard Company in Middletown, Conn., where he will continue to make his residence.

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Chemical Enterprises Expands

Nine companies engaged principally in the distribution of anhydrous ammonia and farm chemicals in the wheat raising sections of Washington, Oregon, and Idaho have been acquired by Chemical Enterprises, Inc. of New York City from W. C. McCall of Portland, Oregon. The new additions complement the activities of three of Chemical Enterprises' present subsidiaries in the Northwest. Chemical Enterprises, Inc. distributes farm supplies — particularly anhydrous ammonia for use as a fertilizer—through its 38 affiliated companies, operating over 250 stations in key agricultural areas of the United States. The McCall operations include facilities for the conversion of anhydrous ammonia to aqua ammonia.

The new companies are: McCall Chemical Company; McCall Farm Chemicals of Oregon, Inc.; McCall Farm Chemicals of Pendleton, Inc.; McCall Farm Chemicals of Umatilla County, Inc.; McCall Farm Chemicals, Inc.; McCall and Huntington Farm Chemicals, Inc.; McCall Farm Chemicals of Idaho, Inc.; McCall Farm Chemicals of Moscow, Inc.; and McCall Farm Chemicals of Lewis County, Inc.

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Emulsol Res. Dir. In Europe

Dr. Charles F. Fuchs, director of research of the Emulsol Corporation, Chicago, was scheduled to attend the world congress on surface active agents in Paris, France, August 30, following which he planned to visit various chemical plants in Austria, Switzerland, France and England.

New NH_3 Plant in Ohio

Standard Oil Co. of Ohio will spend $17,000,000 on the construction of a petro-chemical plant in the Toledo-Lima area, for the manufacture of anhydrous ammonia, urea, nitric acid and nitrogen solutions. Major portion of the plant's output will be used as fertilizers. Construction of the plant is to begin in September with completion expected late in 1955.

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Names Randall Gen. Manager

R. L. Randall has just been appointed general manager of the Downey Fertilizer Company, Downey, California, according to an announcement by Ben Mooschekian, president of the company. Active in Southern California sales and advertising circles since graduating from UCLA in 1939, Mr. Randall has supervised advertising and sales promotion of the firm's "Red Star" fertilizers since 1947, through his own advertising agency for the first four years and subsequently with the present agency, The Jordan Company, Los Angeles.

R. W. Harned Retires

Robey W. Harned, long a prominent figure in cotton insect research and one of the most prominent entomologists in the South, retired from the U. S. Department of Agriculture at the end of July. Prof. Harned directed cotton insect work for the BEPQ for over twenty years, and since the reorganization of USDA last fall has been acting as consultant and staff assistant to the Chief of the Entomology Research Branch, Agricultural Research Service.

Prof. Harned was born in 1884 near Bryantown, Md. He received his B.S.A. degree in entomology from Ohio State University in 1906 and joined the Mississippi A. & M. College faculty a year later. He is a member of the Entomological Society of America, American Assn. for the Advancement of Science, Sigma Xi and numerous other groups. He served as president of the American Association of Economic Entomologists, predecessor organization to the ESA, in 1927.

Prof. Harned was honored at a dinner prior to his retirement, with many friends and associates in the department and from universities all over the country in attendance. The Cotton States Branch of ESA, of which he is a past chairman, honored him at a banquet on the occasion of their annual session at Biloxi, Miss., last January.

Prof. R. W. HARNED

Fungicide Action, Seed Treatments, Resistance Discussed as Phytopaths Meet in Colorado

MORE than 1200 members and guests attended the 46th annual meeting of the American Phytopathological Society, held August 25-27 at Estes Park, Colo., Technical reports dealing with disease resistance, seed treatments, action of fungicides, soil fumigation, etc., highlighted the program, which included some 210 papers. W. J. Henderson was chairman of local arrangements, and Paul R. Miller was chairman of the committee on public relations. George F. Weber, president of the council for 1954 and G. Stout, president of the Pacific Division of the society directed the various sessions.

In a discussion of pink root disease of shallots, T. E. Freeman and E. C. Tims, Lousiana State University, reported that the disease can probably be controlled by adding organic matter to the soil. They indicated that high organic content of the soil encourages the development of bacterial parasites that destroy the disease-producing fungus.

L. M. Black and C. L. Lee, Univ. of Illinois, discussed the synergistic effect of growth-regulating chemicals and tumefacient virus on plant cells, and indicated that the application of plant hormones to sweet clover plants invaded by a tumor-inciting virus initiated the growth of many tumors within a few days, and greatly stimulated their subsequent development.

Abstracts of several other of the 210 papers presented at the three day session follow:

Studies on the mechanism of fungicidal action of the ethylenebisdithiocarbamates. By R. A. Ludwig and G. D. Thorn, Science Service Laboratory, London Ontario, Canada.

The reactions involved in the formation of the metallic ethylenebisdithiocarbamates were found to be more than simple precipitations. Water suspensions of manganese ethylenebisdithiocarbamate, like the parent nabam, readily yielded on aeration a product containing the highly fungicidal compound ethylene thiuram monosulphide (E.T.M.) The pure zinc ethylenebisdithiocarbamates used proved to be relatively non-fungicidal when suspended in distilled water and could not be converted to E.T.M. Addition of a small amount of alkali, however, improved solubility, increased fungicidal activity and permitted conversion to E.T.M. The iron-nabam reaction was found to be more complicated but probably also yielded E.T.M. The results obtained by the standard analytical methods are not necessarily related to fungicidal activity.

As the 46th annual meeting of the American Phytopaths came to a close, the following were announced as new officers of the association: president, James H. Jenson, Iowa State College; president elect, Helen Hart, University of Minnesota; vice president, George W. Fischer, Washington State College; councilor, William B. Snyder, University of California; and editor in chief of "Phytopathology," A. Frank Ross, Cornell University.

The Fungicidal Value of Several Volatile Chlorinated Hydrocarbons. By Edwin B. Oyer and George A. Gries, Purdue Univ.

The vapors from a number of chlorinated hydrocarbons have been found to be effective in inhibiting the development of brown rot of peaches and Rhizopus leak of strawberries. Of the chemicals tested, the chlorinated ethanes and ethylenes were selected as being among the most inhibitory to the fungi while causing little or no damage to the hosts. Dose-response curves were determined for several of the ethanes and ethylenes against conidia of *Monilinia fructicola* and S- tetrachloroethane was found to be the most toxic with tetrachloroethylene, 1,1,2-trichloroethane and trichloroethylene following in order of decreasing toxicity. The data indicate that these chemicals have a similar mode of action and that the vapors from tetrachloroethylene are fungicidal rather than fungistatic.

Effect of Soil Fumigation and Planting Stock on Verticillium Wilt of Peppermint Mentha piperita L. By Ralph J. Green, Jr., Dept. of Botany, U. of Chicago, and John V. Luck, Pabst Brewing Co., Milwaukee, Wis.

Preliminary screening of the vapor phase of more than 30 potential soil fumigants against the mycelial, spore and sclerotial stages of *V. albo-atrum* indicated that the two most effective materials were CBP-55 and Cpd 162 (pentachlorodiene). Tests in muck soil under greenhouse conditions showed that concentrations 2X to 3X above that recommended for mineral type soils were necessary to give comparable results.

Field plots incorporated 3 levels of fumigant application and 3 sources of planting stock. The results, based on per cent infection and yields in green top weight, demonstrated that CBP-55, at rates equivalent to 120 gal./acre, gave the highest yields and lowest infection percentages. In addition, survival was poor in heat-treated rhizomes and there was no significant difference in infection levels between field-dug and known disease-free planting stock.

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Calunite Fertilizer

Calunite, an alunite-based fertilizer is now offered commercially by Calunite Corp., Altadena, Calif. The base is processed in a plant at Marysville, Utah, then shipped to regional mixing plants to be fortified with nitrogen and phosphorous. The company expects to have distribution centers in Los Angeles, Little Rock, Ark., and Stockton, Calif., with a capacity of 6,000 tons a month. Output is scheduled to be doubled by the end of the year, via the addition of mixing facilities at Congerville, Ill., Greenville, Miss., and St. Louis.

Dr. Walter Ripper Outlines World-Wide Operations of

PEST CONTROL, LTD.

DR. WALTER RIPPER

A PESTICIDE business that encompasses all the problems of the manufacture of the basic raw materials right down through their application to various crops in the field, . . . and this on a multi-continental basis . . . from Northern Rhodesia to South Africa, . . . from Cambridge, England to the Sudan . . . The problems of building up such a business as this confronted Dr. Walter E. Ripper, vice-chairman of Pest Control, Ltd., Cambridge, England. Started in 1939 by Sir Guy A. K. Marshall and Dr. W. E. Ripper, Pest Control, Ltd. now employs about 2,000 individuals, who work on various aspects of countless pest control problems in England and on the continent of Africa.

Pest Control Ltd. has this year become a member of the Fisons group and Fisons Ltd are Britain's largest manufacturers of fertilizers. There are a number of African subsidiary companies of Pest Control, Ltd., Pest Control (Sudan) Ltd. and Pest Control (East Africa) Ltd. In Rhodesia and Central Africa, the company operates as Pest Control Central Africa, Ltd. In South Africa, it is known as Pest Control and Crop Protection, Ltd.

The company manufactures basic pesticidal and herbicidal materials, produces its own spraying equipment and offers a spraying service for the application of pesticides and herbicides in England and Africa. To keep in touch with current developments around the world in pesticides and their application, Dr. Ripper makes periodic trips to important areas for the latest on-the-spot information. He has just completed a trip to the United States, where in the course of the past month, he visited the USDA offices in Washington and Beltsville, Boyce Thompson Institute in Yonkers, N. Y., and N. Y. State College of Agriculture at Cornell University in Ithaca, N. Y., the California Institute of Technology at Pasadena, the Agricultural Experiment Station in Prosser, Washington, the College of Agriculture at the University of California, Riverside, Calif., and a number of leading chemical industries and their research laboratories.

Interviewed by a representative of AGRICULTURAL CHEMICALS in New York at the conclusion of this trip, and just prior to his return to England, Dr. Ripper outlined some of the operations of his firm, reviewing the principal pest control projects in which they engage, and citing some of the differences in materials and methods used in England and Africa, as contrasted with practice in the United States.

In England, Dr. Ripper indicated that MCPA (MCP) is probably the most commonly used herbicide, being used much more widely than 2,4-D. He said that DNC (activated dinitro ortho cresol) is used on the hardier weeds in cereal crops, and that other commonly used herbicides are TCA and alkyl amino salts of dinitro secondary butyl . . . . phenate. The copper compounds such as the oxychlorides, and cuprous oxide and mercurials are the fungicides in most common commercial use.

Pestox-3 (schradan) is used to control aphids and red spiders, while aldrin, chlordane and heptachlor are used to control soil pests, such as wireworms and cutworms. BHC is now less widely used in England against soil pests, due to the off flavor problem. He pointed out that helicopters are preferred for aerial spraying in England because the small fields and high winds make employment of airplanes hazardous and less efficient. The company normally uses aeroplanes for their spraying operations in Africa.

As in the United States, foliar nutrients are coming into use and sales of pesticide-fertilizer mixtures are on the increase. Aldrin is incorporated by Fisons Ltd. in fertilizers for control of wire worms in potatoes; and commercial use of 2,4-D in fertilizer combinations for lawns has had a favorable response. Some four years ago, Pest Control, Ltd., acquired a lime and fertilizer spreading company, and now the firm also offers a fertilizer and lime spreading service.

In the Sudan, cotton is the chief crop, and control of the leaf hopper, *jassid*, is of particular importance. A 2% per cent DDT emulsion controls this pest, resulting in considerably increased cotton yields. Locusts constitute in many years a serious threat to the Lintonen agriculture, which is met by poison dust application against the hoppers and by aerial spraying of DNC (dinitro ortho cresol) in oil against flying locust swarms. This product has the advantage of quick knockdown. For weed control in the Sudan, MCP and

(*Turn to Page* 137)

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Tisdale Retires from du Pont

W. H. TISDALE

Dr. Wendell H. Tisdale, plant pathologist and a technical advisor on agricultural subjects in the Du Pont Company's Grasselli Chemicals Department, retired July 31 after 27 years with the company. He joined du Pont in December, 1926.

During his career with Du Pont, Dr. Tisdale was instrumental in development of the dithiocarbamate and thiuramsulfide fungicides. He is credited also with development of "Lignasan" fungicide for control of stain-producing fungi in lumber, and helped to develop "Ceresan" seed disinfectant.

Earlier, while a plant pathologist with the U. S. Department of Agriculture in Washington, Dr. Tisdale developed a method for control of straighthead disease of rice which is still in use after more than 30 years. He also was instrumental in the development of smut resistant strains of wheat and of the copper carbonate method of seed treatment.

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Anhydrous Sales Up 15%

Sales of anhydrous ammonia for direct application to the Nation's farm crops increased nearly 34 per cent during the first five months of 1954 as compared with the same period in 1953. This trend in distribution of anhydrous ammonia—a liquid form of commercial fertilizer containing 82 per cent pure nitrogen—is indicated in a survey made by the Agricultural Ammonia Institute.

In arriving at the 34 per cent increase, the AAI compiled reports from 15 distributors who do business in 20 of more than 40 states using agricultural ammonia. Their combined tonnage represented about 10 per cent of the nation's direct application sales in 1952-53.

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V-C New Sales Offices

Virginia-Carolina Chemical Corp., Richmond, Va., has formally opened its new sales office and fertilizer plant in Hopkinsville, Ky. The Hopkinsville facilities were formerly operated as the Cumberland Chemical Co., and were purchased by V-C in June of this year. The opening of new sales facilities at Fort Wayne, Indiana, where Virginia-Carolina has operated fertilizer manufacturing facilities since 1915, were also announced recently.

Dave S. King has been named manager of the Hopkinsville office, and Al C. Rutland has assumed the duties of superintendent. C. H. Godfrey has been named manager of the new Fort Wayne sales office, and J. N. Stone, formerly a V-C salesman in the Fort Wayne area, has been named assistant to the manager at the new office.

National Chemical Show

The 8th National Chemical Exposition—set for the Chicago Coliseum October 12-15—will also include joint meetings with The Manufacturing Chemists' Association, The Chemical Market Research Association, The Society of Chemical Industry, and The Purchasing Agents' Association.

Symposia on packaging, transportation, labelling and exposition marketing will be held.

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LINDANE wettable powder (25% and 75% concentrations) controls wireworms and false wireworms — two of the most destructive pests to winter wheat.

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Union Personnel Changes

Z. X. BENNETT E. E. GRATSCH

Union Special Machine Co., Chicago, announces recent personnel changes in the St. Louis and Southwest territories. Elmer E. Gratsch, with the company for 47 years, is retiring as manager of Union Special's St. Louis office.

Zachary X. Bennett, formerly assistant manager of the St. Louis office, has been appointed manager of that branch; and Hugh L. Gratsch, with Union Special since 1941, as a representative in the Texas territory, now steps up to succeed Mr. Bennett as assistant manager of the St. Louis office.

With the new appointment of Hugh Gratsch, the territory formerly held by him is being divided between Harry E. Pearson and Emmett Richards, both of whom have been with Union Special since 1951.

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Shade Tree Conf. Meets

Some 600 members and guests were expected to attend the 30th annual National Shade Tree Conference held August 30th to September 3rd, at Haddon Hall Hotel, Atlantic City, New Jersey. An election of new officers and committee members was featured on the agenda of the business sessions, and a meeting of the National Arborists Association on August 30th was to open the convention activities. Trade exhibits were featured throughout the 4-day meeting.

The following reports were included in the technical program:

"How Water Acts in the Soil" by W. A. Mitcheltree, New Jersey Agric. Ext. Serv., New Brunswick.

"The Control of Some Gall Insects" by Dr. R. B. Neiswander, Ohio Agr. Exp. Sta., Wooster, Ohio.

"The Nature and Control of Leaf Miners of Trees and Shrubs" by J. G. Matthysse, Cornell Univ., Ithaca, N. Y.

Termite-Proofing Injuries to Shade Trees and Shrubs" by J. Ott, Evanston, Illinois.

"Tree Spray Oils" by E. R. Smith, New York Agric. Exp. Sta., Geneva, N. Y.

"Tree Moving Practices and Problems," by H. M. Van Wormer, Richmond, Va.

"Plant Clinic," moderator Spencer Davis, Jr., Rutgers Univ., New Brunswick, N. J.

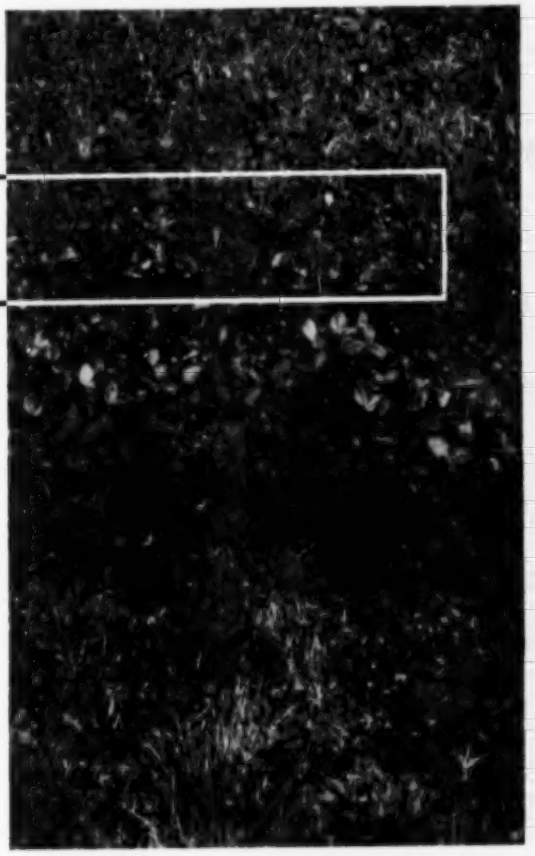
"Air Layering as a Method for Propagation for Arborists" by P. P. Pirone, N. Y. Botanical Garden, New York City.

Viale Joins Hercules

Emilio Viale, recent addition to Hercules Powder Co. staff of entomologists, has just completed a tour of Peru, Colombia, Nicaragua, Guatemala, El Salvador, and other Central and South American countries where he aided in the control of agricultural insect pests. Toxaphene insecticides are used extensively in these areas.

Before his position with Hercules, Dr. Viale was engaged in ento-

moly makes the clover grow



Sodium molybdate at one ounce per acre increased the yield of red clover in this field six times. Top, sodium molybdate; bottom, no treatment.

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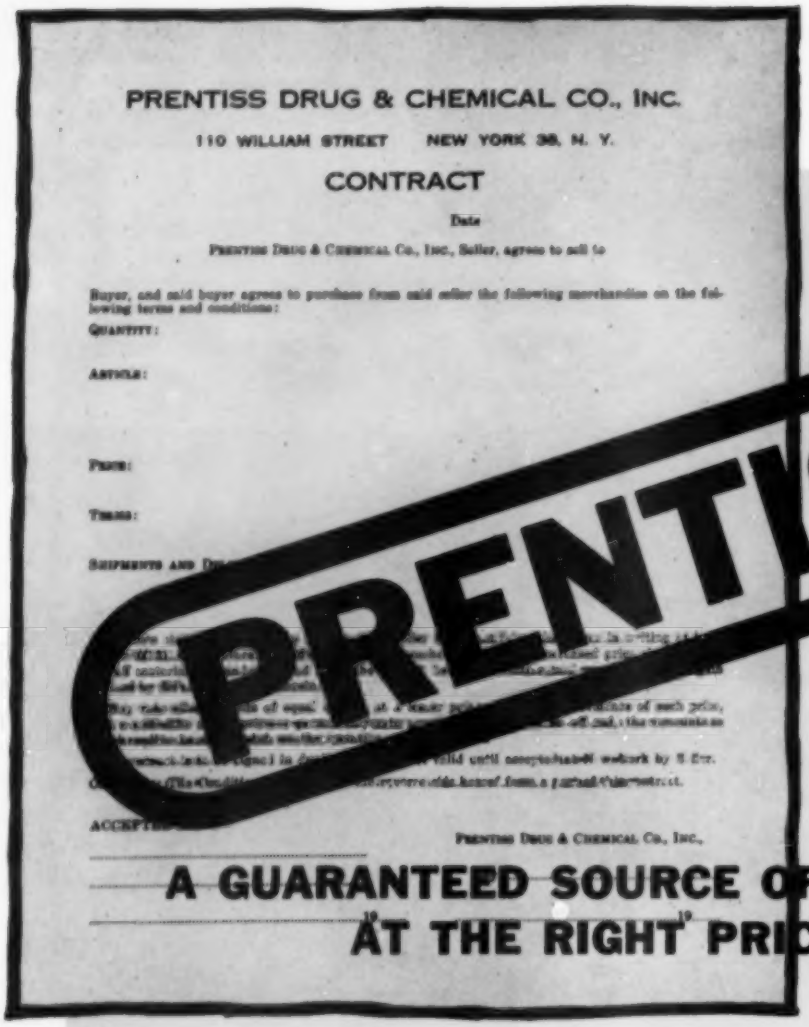
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mological research projects in Peru and Costa Rica. He is now visiting agricultural research centers in the United States, including Hercules new Agricultural Chemicals Research Laboratory, but will return to his headquarters at Sao Paulo, Brazil, in late summer.

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Attapulgus Advances West

Attapulgus Division, Minerals & Chemicals Corporation of America, Philadelphia, announced recently the appointment of Robert W. Wert to head the technical sales and service staff handling the company's agricultural chemical products. Mr. Wert succeeds W. M. Jarnagin, who has been assigned to a development project apart from agricultural sales.

•

IMCC Transfers Lindsey

Jack K. Lindsey, formerly district sales manager of International Minerals & Chemical Corporation's Plant Food Division, Cincinnati, has been appointed district sales manager, Potash Division, Shreveport, La. Mr. Lindsey, who has been employed by International since July, 1952, was formerly sales manager for the Buhner Fertilizer Company of Danville, Ill. Prior to that he supplied technical service in the sales department of Spencer Chemical Co., Kansas City, Missouri.

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Allied Expands NH_3 Capacity

Plans to double the ammonia capacity of its new plant at Omaha, Nebraska, and to install facilities to produce various types of nitrogen fertilizer solutions were announced recently by Nitrogen Division, Allied Chemical & Dye Corp., New York. Hugo Riemer, president of Nitrogen Division, stated that construction of the new facilities will begin as soon as the necessary supply of natural gas for raw material has been assured.

Construction of the first units of the plant, with a capacity of 61,000 tons of nitrogen annually in the form of ammonia and urea, was recently completed. The ammonia facilities were placed in run in April and the urea facilities in July.

New Bemis Plant In Operation at Wilmington, Calif.

A new Bemis Bro. Bag Co. multiwall paper shipping sack manufacturing plant under construction since October, 1953, has started operations at Wilmington, Calif. It replaces the former Wilmington plant which the company had operated for 22 years.

The new plant provides increased multiwall bag manufacturing capacity and space for planned future expansion. Full productive capacity is expected to be reached by the end of September, when all moving operations are completed.

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Conveniently packaged, ready to apply, protective chemicals help turn fabled gardens into a fabulous reality. Quite contrary to popular belief in "green thumb" magic, successful gardening results from proper care and protection against bugs and blight. The control of garden pests is made easy with scientifically formulated insecticides and fungicides, produced by FMC's Niagara Chemical Division, a leader in the agricultural chemicals field. This is an example of how FMC is putting ideas to work through horticultural chemistry.

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IMCC Appointments

J. D. ZIGLER

D. W. ALLISON

Advanced as of September first to the newly-created position of operating manager of International Minerals & Chemical Corporation's Plant Food Division is John D. Zigler, who has been area manager at Chicago Heights, Ill., for the past three years. He has been with IMCC for 20 years.

F. S. Walters has been appointed acting production manager, replacing F. H. Perrin who resigned recently, and Don W. Allison becomes industrial engineering supervisor for the Plant Food Division.

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Foreign Markets On Agenda

The resurgence of the foreign chemical industry will be discussed at a meeting of the Commercial Development Association on October 7 and 8, at the Bedford Springs Hotel, Bedford, Pa., according to an announcement by Frank Waldo, general chairman of the meeting.

The CCDA meeting will not concern itself with physical exports and imports of goods or tariffs, but will review the transfer of technological know-how as a means of commercializing new developments in international markets.

•

Armyworms Expected in Conn.

An outbreak of the fall armyworm, a serious pest of grasses and related plants, can be expected in Connecticut this year, according to Neely Turner, chief entomologist at The Connecticut Agricultural Experiment Station. The pest has been causing unusually severe damage in Massachusetts this year and has now been reported in Connecticut. The first heavy infestation in this State has occurred in a field of oats in Litchfield County, where thousands of armyworms are feeding.

To control the pests in pastures or lawns, sprays or dusts of toxaphene or DDT may be used. In small grain fields, some farmers prefer to use toxaphene baits, to avoid contamination of the grain with insecticides. Poisoned baits may also be used in corn fields, or the crop can be dusted with either toxaphene or DDT.

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Smith-Douglass Appointment

Smith-Douglass Co., Inc., Norfolk, Va., announces the appointment of Robert V. Peabody as general traffic manager. This is a new position with Smith-Douglass. Mr. Peabody was formerly with U. S. Industrial Chemicals Co. division, National Distillers Products Corp., New York.

Diamond Appoints Collins

Diamond Alkali Co., Cleveland, O., announced last month the appointment of Dr. William E. Collins to the technical staff of the Chlorinated Products Division.

Having already assumed his new post, Dr. Collins will be concerned chiefly with development of new agricultural chemicals as well as technical service on Diamond's present products having agricultural applications. He will be headquartered at Newark, N. J.

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With the "NEW LEADER" Metering Attachment you will now know exactly how many pounds of fertilizer per acre you are spreading. With the old method, the truck driver often spread the entire load of fertilizer before he realized he was spreading either too heavy or too light.

This Metering Attachment fits all late model "NEW LEADER" twin disc spreaders. It is inexpensive, easy-to-install, and accurately meters from 100 pounds to several tons per acre.

It is amazingly simple to operate and no fertilizer is spread on the ground until you are satisfied the spreader is accurately set for the correct amount per acre desired. This new Metering Attachment with the many other outstanding features of the "NEW LEADER" motor driven spreader, gives your customer the kind of consistent and uniform spreading job he expects.

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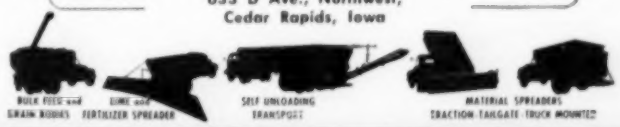
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Benzene Hexachloride INSECTICIDE

Manufacturers of pesticides have learned to depend on Columbia-Southern® quality and service. Processors now realize that the exceptionally high quality of Columbia-Southern raw materials gives them cost-cutting advantages which can make a real difference on profit margin.

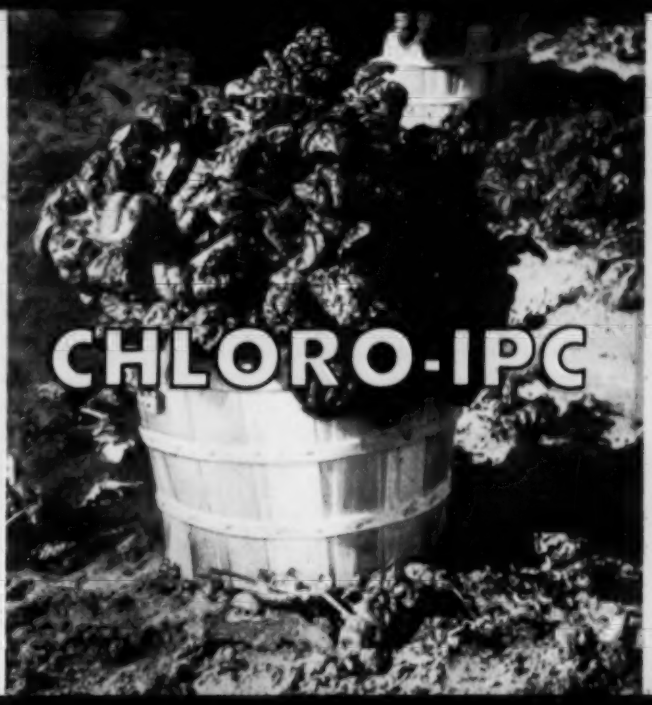
How can the manufacturer increase this profit margin? Columbia-Southern's high quality means (1) *increased production rate;* (2) *minimized plant shut-down;* (3) *better quality in finished goods.* In addition, Columbia-Southern's ability to ship *when needed* means stock control that cuts down your inventory, yet allows you to meet the grower's emergency demands.

Columbia-Southern BHC is produced under exacting standards to provide the finest raw material for faster processing and accelerated mill throughput.

BHC is notable for its great strides in increasing cotton yield through effective control of the boll weevil. In addition to this use, however, BHC is also employed for the following: control of corn root worm, spittlebugs in field crops, ambrosia beetles in logs and lumber. In nurseries, BHC accelerates the rate of sapling growth when applied to the soil. BHC dust and sprays control cattle lice.

Columbia-Southern BHC is supplied as technical (flake) 13.5-16.0 gamma and as concentrate (solid) 32.0-40.0 gamma.

COLUMBIA-SOUTHERN



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Hi-Sil is supplied in 25 lb. paper bags.

Isopropyl N(3-Chlorophenyl) Carbamate HERBICIDE

Chloro-IPC, when sprayed on the ground simultaneously with the planting of cotton or leafy vegetable crop seeds, controls weeds before they emerge.

In cotton, for example, Chloro-IPC reduces hoeing costs up to 90%. One large planter reported that Chloro-IPC treated cotton cost him only $1.18 per acre to hoe as compared with $15 to manually hoe an untreated acre.

A prominent Southern banker is willing to loan $2 more per acre if the farmer will use Chloro-IPC in his cotton plantings.

The U. S. Department of Agriculture has recently approved the use of Chloro-IPC on certain vegetable crops.

Columbia-Southern Chloro-IPC is available as technical solid and 70% solution.

For further information, contact our Agricultural Chemicals Department at our Pittsburgh address.

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CBCC Plans Taxonomy Code

A preliminary meeting was held recently to explore the possibility or advisability of developing a uniform system for use in coding biological taxonomic entities. Participants at this exploratory meeting were from the Library of Congress, the United States Department of Agriculture, the Smithsonian Institution, and the Chemical-Biological Coordination Center of the National Research Council.

It is known that several laboratories are entering the results of their experiments on machine or hand-sort punch cards and that at least a few are listing the species of plants or animals tested by means of a code on these punch cards. In order to facilitate the exchange of information between various laboratories, it would seem to be highly desirable for these research groups to use a uniform taxonomy coding system. If the need or usefulness of uniformity is confirmed by sufficient biologists, a start on the formation of a standardized code should be made as soon as possible so that the conversion from individual codes can be accomplished with a minimum of effort.

The interested persons who have been informally discusing the project do not want to set plans in motion for the actual codification unless there is a real or potential need for it. Our immediate problem, therefore, is to determine what areas of biology could be usefully served by a standard taxonomic code. We are, therefore, requesting that those who have worked out or adopted a system for coding taxonomic entities, or who may be conducting work which might benefit from such codification, submit their opinions concerning a standardized biological taxonomy code.

Letters should be addressed to: Dr. G. Condon Wood, Chemical-biological Coordination Center, 2101 Constitution Avenue, N. W., Washington 25, D. C.

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New Research Station

Establishment of a new field station for research on stored-grain insects at Mesa, Ariz., was announced early in August by the U. S. Department of Agriculture. A major project at the station will be an attack on the Khapra beetle, a pest infesting grain, seeds, and grain products in many other parts of the world and recently discovered in the United States. So far, the infestation is limited to certain areas in California, Arizona and New Mexico.

The new research station is being set up at the invitation of the western state experiment stations. First work of the new station will be directed at (1) the development of fumigation procedures or other treatments to kill the Khapra beetle in grains, feeds, seeds, and shipping facilities to prevent the spread of the pest, and (2) the investigation of fumigants, sprays and other treatments for application to infested structures and surrounding areas to reduce or eliminate infestations.

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Barr, Johnson Address Beltwide Cotton Group

THE importance of chemicals to protect cotton from disease and weeds was emphasized by two speakers in talks scheduled to be given at the Beltwide Cotton Mechanization Conference in Little Rock, Ark., July 28-30.

Dr. Harold T. Barr, of Baton Rouge, head of agricultural engineering research, Louisiana State University, said the use of herbicides may slash weed control costs in half for many cotton growers.

Another speaker, Dr. H. G. Johnston, of Memphis, head of research development, production and marketing division, National Cotton Council, pointed out the insurance value of controlling diseases and pests in cotton production.

The two men were joined by a long line of experts who discussed all phases of cotton mechanization, including irrigation, equipment, financing, production and marketing.

Emphasis at the meeting was placed on pre-harvest practices and long-range problems in cotton belt agriculture. It was sponsored by the National Cotton Council of America in cooperation with land-grant colleges, the Farm Equipment Institute, USDA, and other groups. Headquarters for the sessions was the Hotel Marion. The complete program appeared in the July *Agricultural Chemicals*, page 99.

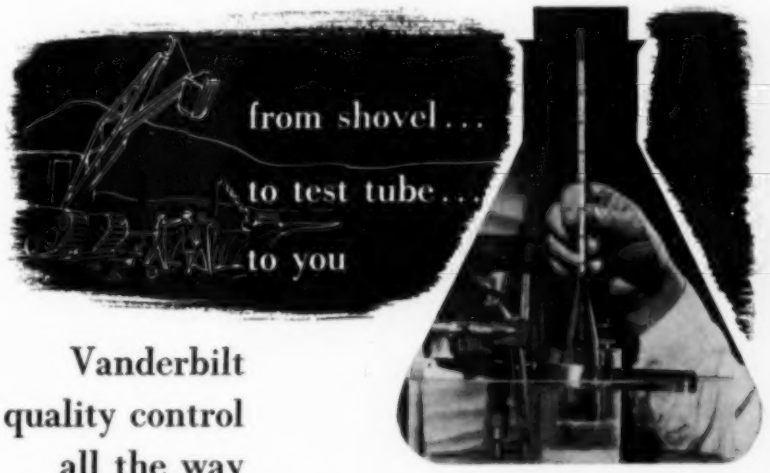
More than 600 persons attended the meetings, which ended with a demonstration of modern cotton production practices on nearby farms.

In discussing herbicides, Dr. Barr stated that on one-quarter acre test plots at St. Joseph, La., last year chemical weed control costs were less than $10 an acre, noting that hoe labor in the Louisiana-Mississippi Delta area currently averages approximately $20 an acre.

"One-quarter acre test plots at St. Joseph last year with DN, CIPC, and WK "M" all gave good weed control," he reported. Lowest total for weed control of the three chemicals at the recommended rate was for DN at six pounds, he said. This was $9.40 per acre for the pre-emergence application followed by hoeing and flaming; $9.82 per acre for the same pre-emergence treatment, plus post-emergence application of the same rate of chemical.

Dr. Johnston, in airing the problem of insect and disease control, asserted that "the sole purpose of control is to insure the maximum potential yields that the soil is capable of producing, and to preserve the quality inherent in the variety of cotton planted."

"Neither practice," he added, "can increase the basic yielding capacity of the soil nor improve the quality characteristics of any variety of cotton. However, neglect or improper use of either of these practices may reduce the potential yield or greatly impair the inherent quality of any variety of cotton which required years



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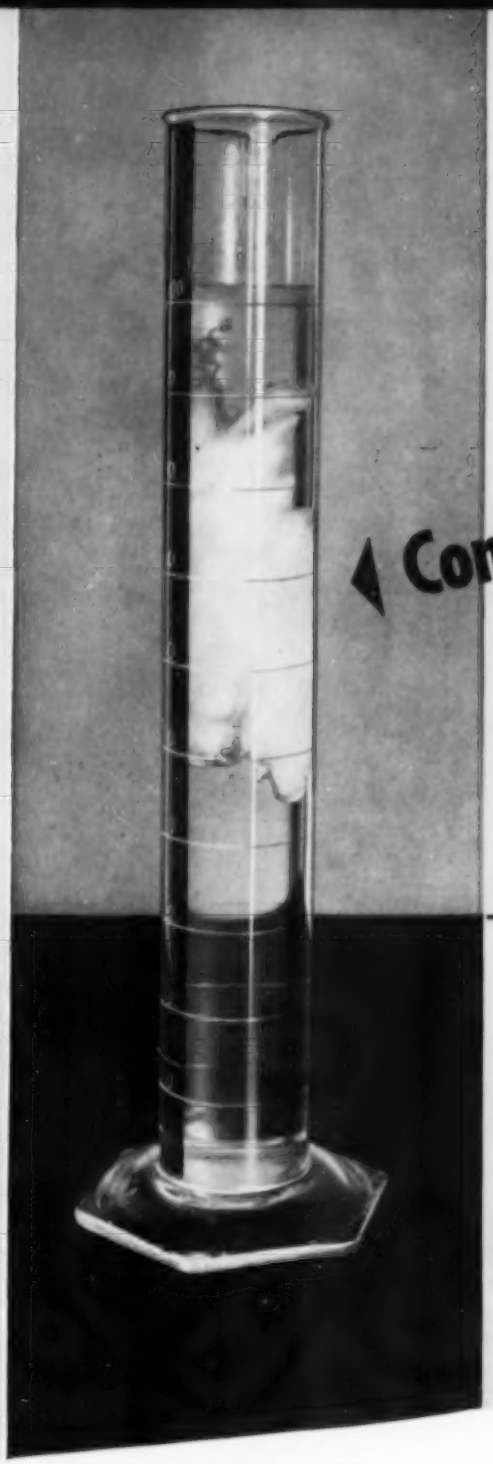

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4. Recommended dilution _____
5. Lbs. toxicant/gal. of concentrate _____
6. Desired emulsion stability _____
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of painstaking effort for the plant breeder to develop."

Dr. Johnston stated that despite progress in protecting cotton at planting time, no more than two-thirds of the planting seed is properly treated each year and seedling diseases still hold top rank among cotton disease losses.

Noting that seed treatment alone is not always enough to protect the seedling against soreshin and blight, he said that the practice of spraying or dusting fungicides into the furrow at planting time looks promising.

•

New NH_3 Phosphate Plant

Start of construction on a new ammonium phosphate plant at Brea, Calif., was announced recently by Brea Chemicals, Inc., subsidiary of the Union Oil Company of California.

The ammonium phosphate plant will be constructed by Macco Corp. and is scheduled for completion the latter part of September. The company expects to have two similar plants in operation at Brawley and Fresno, Calif., early next year. The plants will blend a totally soluble phosphoric acid, supplied by Monsanto Chemical Co., with Brea aqua ammonia to form ammonium phosphate.

•

Canadian Fertilizer Plant

Plans are nearly completed for a proposed $18,000,000 fertilizer plant in southern Alberta, Canada, officials of the New British Dominion Oil Co. announced following a meeting of shareholders. The plant will be used for processing ammonium nitrate with gases drawn from the company's well in the Etzikom area, a spokesman said.

•

D. Fairchild Dies

David Fairchild, 85, who served in the USDA from 1906 until his retirement in 1938 as head of the Office of Plant Introduction, died early in August. Dr. Fairchild had toured the world in search of plants, fruits, trees and species of grasses which could be introduced into the United States.

Raymond Appoints Reps

J. M. GREEN

A. P. WOLFF

Raymond Bag Co., Middleton, Ohio, announced last month the following appointments to their sales staff: James M. Green, with headquarters in Louisville, will direct sales in southern Indiana and Kentucky. A. P. Wolff, with headquarters in Detroit, is appointed to direct sales in northern Indiana, and in Michigan.

•

New Fertilizer Plant in Me.

Through a recently formed subsidiary, Shur-Gain, Inc., is now operating a new fertilizer plant at Presque Isle, Me.

TYPE 41 CLAY

In making organic concentrates using benzene hexachloride, chlordane, toxaphene, and other similar materials, it is important to have the concentrates free flowing.

TYPE 41 Clay can be combined with more costly diluents, such as Fuller's earth, and the result will be a free-flowing concentrate, at a lower cost to the producer.

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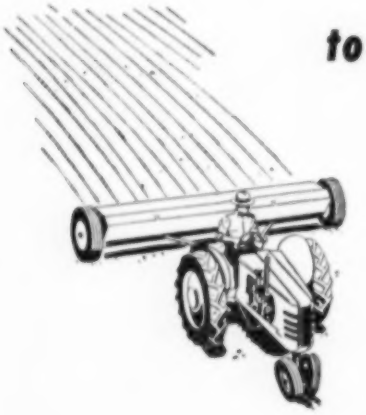

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REPUBLIC AMMONIUM SULPHATE

Vulcan Expands Operation

Vulcan Steel Container Co., Birmingham, Ala., announced recently plans to expand its present building to increase operations by about 30 per cent. Vulcan manufactures a full line of sizes of steel pails, from 1 to 8 gallons, open head and drum type, hi-bake lined and lithographed.

•

R.I. Field Day

The 23rd annual Greenkeepers' Field Day, at the Agricultural Experiment Station, Kingston, Rhode Island, was held August 19-20. Exhibits and demonstrations of labor saving materials and equipment were featured at the meeting, highlighted by a Rhode Island clambake.

Technical sessions and tours of the station turf and field plots, centered attention on lime and fertilizer requirements, use of soil conditioners, nematode control, fungicides for Dollar Spot, and a clinic on turf problems. Lawn and garden problems were discussed at a meeting on August 21st.

•

Safety Congress, Oct. 18-19

Demonstrations, exhibits and motion pictures will highlight the chemical sessions at the 42nd National Safety Congress and Exposition to be held in Chicago, Oct. 18-22. The Fertilizer Section will hold its meetings Oct. 18-19 at the La Salle Hotel; exhibits will be on display at the Conrad Hilton Hotel.

The fertilizer section program includes a panel discussion by several safety experts, and will be headed by W. E. Powell, Liberty Mutual Insurance Co. The panel, "Stump the Experts" will be open to the meeting for discussion of problems in the industry.

•

K-State Protectant Studies

Some 50 Harvey county wheat growers are cooperating with Kansas State College this year in an experiment to test the effectiveness of various liquid and powdered pyrenone wheat protectants, reports Donald Wilbur, K-State entomologist who is in charge of the College's stored grain insect investigations. A total of 160 bins of wheat are included in the program.

The farmers applied the protectants as the wheat came from the combine. Between now and the advent of cold weather, Wilbur and his assistants will make regular checks of the bins to determine insect population buildups for the various protectant treatments. This is the fifth year in which K-State entomologists have conducted studies of this kind. K-State is now working particularly with pyrenone dusts and emulsions and malathion.

Larrick to FDA Post

George P. Larrick, deputy commissioner of the U. S. Food and Drug Administration since June 1951, became Commissioner early in August, following the retirement of C. W. Crawford.

•

Hudson Plans Expansion

Plans for a new building with a floor capacity of more than 80,000 square feet at the Palatka mill of the Hudson Pulp & Paper Corp., New York, were announced at a recent sales service seminar of the staff.

6

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Because of their inertness and great bulk per unit of weight, Celite Mineral Fillers make ideal bulking agents for powders and pastes. Their tiny multi-shaped particles interlace to stiffen and strengthen admixtures. The microscopically small facets of these particles diffuse light so effectively that they can be utilized to impart any desired degree of flatness to a surface film. Their light, porous nature improves suspension, helps prevent segregation. And their porous, thin-walled cellular structure imparts a delicate non-scratching abrasive action.

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- Elimination of Caking
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- Better Dry Mixing
- Improved Dispersion

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AIBS at Gainesville

Twenty five societies were scheduled to attend the annual AIBS sponsored meeting of the biological societies at the University of Florida, Gainesville, Fla., on September 5-9. Some 950 papers of the American Society for Horticultural Science, American Society of Plant Physiologists, Ecological Society of America, and 22 other societies, were on the agenda, which also included field trips to processing plants, citrus groves, plant and landscape nurseries, phosphate mining, etc. Some of the reports scheduled for the meetings are listed below:

Where Are We Going on Fertilizing Horticultural Crops? A. L. Towson, Vegetable Growers' Association of America, Inc.

What's New in Fertilizing Deciduous Fruits? A. L. Kenworthy, Michigan State College, Lansing, Mich.

Inclusion of Insecticides, Fungicides, and Herbicides in Fertilizer. K. D. Jacob, USDA, Washington, D. C.

A Study of Some Responses of Florida Citrus Trees to Nitrogen Nutrition and Irrigation. Ahmed El-Tomi, and H. S. Wolfe, University of Florida, Gainesville, Fla.

The Use of Stoddard Solvent in Weeding Cranberries. R. H. Roberts, University of Wisconsin, Madison, Wisc.

Responses of the Common Delicious Apple to Sprays of 2,4,5-Trichlorophenoxyacetic Acid. Thurman T. Hatton, Jr., North Carolina State College, Raleigh, N. C.

Effects of Urea Sprays in Combination with Various Pesticides on Finish of Stayman Fruit. Tony Kom and N. F. Childers, Rutgers University, New Brunswick, N. J.

Concentration and Timing of Antibiotic Sprays for Control of Fireblight of Apple. Robert N. Goodman, University of Missouri, Columbia, Missouri.

The Effect of Foliar Applications of Certain Antibiotics on Control of Bacterial Leaf Spot of Peaches. P. L. Hawthorne and N. L. Horn, Louisiana State University, Baton Rouge, La.

A Preliminary Report on the Effect of Crag Experimental Fungicide 974 on the Growth of Papaya Plants. R. A. Hamilton, University of Hawaii, Honolulu.

How to Apply Trace Elements. J. R. Beckenbach, Florida Agricultural Experiment Station, Gainesville, Fla.

Effects of Potassium and Magnesium on Absorption and Tissue Concentration of Nutrients by Apple Trees in Sand Culture. John C. Cain, New York Agricultural Experiment Station, Geneva, N. Y.

The Apparent Absorption of Phosphorus and Magnesium by McIntosh Apple Leaves. E. G. Fisher and D. R. Walker, Cornell University, Ithaca, N. Y.

The Effect of Urea Sprays on Sour Cherry Trees. David R. Walker and Elwood G. Fisher, Cornell University, Ithaca, N. Y.

The Magnesium Problem in Michigan Orchards. Clarence A. Langer, Michigan State College, East Lansing, Mich.

Further Studies of Response of Peach to Major and Trace Elements under Field Conditions. Ernesto Hernandez and N. F. Childers, Rutgers University, New Brunswick, N. J.

Studies on the Magnesium Content of the Peach Tree at Various Seasons of the Year in Georgia. Kenneth W. Hanson, New York State Agricultural Experiment Station, Geneva, N. Y.

Effects of Nitrogen, Phosphorus and Potassium on Growth, Yield, and Leaf Composition of Mature Tung Trees on Red Bay Fine Sandy Loam. S. Merrill, Jr., and R. T. Brown, U. S. Field Lab. for Tung Investigations, Bogalusa, La.

Interrelations of Source of Nitrogen with Levels of Nitrogen, Calcium, and Magnesium in Tung Nutrition. M. Drosdoff, H. L. Burrows, F. S. Lagassee and C. B. Shear, U. S. Field Lab for Tung Investigations, Gainesville, Fla.

Bibb Lettuce Yield and Mineral Composition as Influenced by Soil Exchange Capacity, Potash Saturation and Source of Potash. Victor Neal Lambeth, University of Missouri, Columbia, Mo.

Chelated Iron as Soil and Foliar Applications for Vegetables and Ornamentals. Philip J. Westgate and J. D. Wright, University of Florida Central Florida Experiment Station, Sanford, Fla. and Geigy Company, Inc., Orlando, Fla.

Relative Effectiveness of Foliar Applications of Several Manganese Sources in Correcting Manganese Deficiency. Charles Ozaki, University of Florida, Everglades Experiment Station, Belle Glade, Fla.

Effects of Al, Fe, and Mn Upon the Growth and Composition of Lettuce. M. E. Harward, W. A. Jackson, W. L. Lott, and D. D. Mason, North Carolina State College, Raleigh, N.C.

Effects of Some Newer Pesticide Sprays on the Performance of Apple Trees. O. F. Curtis, Jr., E. H. Glass, J. M. Hamilton and M. Szkolnik, New York Agricultural Experiment Station, Geneva, N. Y.

Mulching in Relation to Soil Analysis. Shue Shan Kwong and A. L. Ken-

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worthy, Michigan State College, East Lansing, Mich.

Combination of Chemical and Mechanical Weed Control in Onions Growing in Peat Soil. E. A. Wolf and V. L. Guzman, University of Florida, Everglades, Experiment Station, Belle Glade, Fla.

The Effects of Soil Conditioners on the Growth of Horticultural Crops and the Physical Properties of Georgia Soils. F. E. Johnstone, Jr., H. D. Morris and K. W. Hanson, University of Georgia, Athens, Ga.

Influence of Several Phosphate Sprays on Phosphorus Deficiency of Valencia Orange Trees. T. W. Embleton, J. D. Kirkpatrick and W. W. Jones, University of California, Citrus Agricultural Experiment Station, Riverside, Calif.

The Mechanics of Applying Anhydrous Ammonia on Vegetable Crops. Joseph D. Campbell, Mathieson Chemical Corporation, Baltimore, Md.

Effect of Growth Regulators on Thinning of Peaches. Clarence A. Langer, Michigan State College, East Lansing, Mich.

The Effect of Preharvest Sprays of 2, 4, 5-trichlorophenoxyacetic Acid and Maleic Hydrazide Upon Certain Peach Varieties. P. L. Hawthorne, Lloyd G. Jones, J. C. Taylor and William A. Sistrunk, Louisiana State University, Baton Rouge, La.

Alpha-naphthylacetamide: A Chemical Fruit Thinner. Deforest Alderman, West Virginia University, Morgantown, W. Va.

Carbamate Herbicides as Fruit Thinners, Frank Horsfall, Jr. and R. C. Moore, Virginia Polytechnic Institute, Blacksburg, Va.

Some Recent Advances in the Study of Micronutrient Metals in Plant Nutrition. Daniel I. Arnon, University of California, Berkeley, Calif.

Accumulation, Distribution, Toxicity and Interrelationships of Heavy Metals in Plant Nutrition. Paul Smith, U. S. Field Station, Orlando, Fla.

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Mich. Chem. Earnings Gain

Michigan Chemical Corp., St. Louis, Mich., released earnings early in August, which showed net sales of $1,986,116 and net profit, $90,064, as compared with net sales of $1,686,379 and net profit of $39,873 in 1953. Favorable reports were given on the company's insecticide and fumigant units, with volume and prices in improved conditions.

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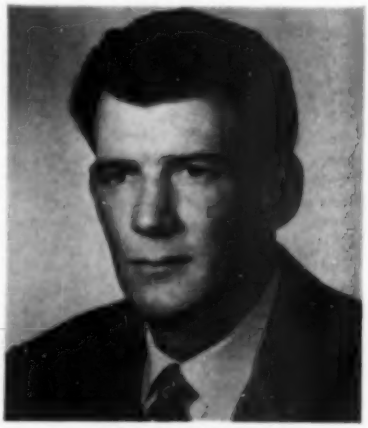
Nitro Div. Plant Operating

Initial production of urea was obtained recently at the new Omaha, Neb. plant of Nitrogen Division, Allied Chemical & Dye Corp. The ammonia facilities at this plant went into operation in April, 1954. The operation utilizes natural gas and air as raw materials and is designed to produce and ship over 100,000 tons of nitrogen products a year.



John V. Carroll

Mr. Carroll was recently appointed manager of the Minneapolis office of Riverdale Chemical Co., Harvey, Ill. Prior to this appointment Mr. Carroll had represented Riverdale in Iowa. A warehouse has been established in connection with the Minneapolis office to service accounts in Minnesota, North and South Dakota, Wisconsin and Iowa.

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S. C. Fertilizer Safety Conf.

Vernon Gornto, chairman of the fertilizer section of the National Safety Council, and T. J. Clarke, vice chairman, have organized a Fertilizer Safety Section in South Carolina. Meetings will be held at the South Carolina Annual Accident Prevention Conference in Spartanburg on November 18 and 19.

A tentative program for the meeting includes reports by J. Miskelly, Mathieson Chemical Co.; C. J. Watts, Jr., Naco Fertilizer Co.; E. O. Burroughs, Jr., F. S. Royster Guano Co., and Curtis A. Cox, Virginia Carolina Chemical Co.

•

Spencer Elects Culpepper

J. R. Riley, Jr., vice-president in charge of sales of Spencer Chemical Co., Kansas City, Mo., has resigned this position. Mr. Riley will continue, however, to be active in the management of the company as a consultant, director and member of the executive committee. J. E. Culpepper, formerly general sales manager, was elected vice-president, and will continue to serve as general sales manager.

Concurrently, three sales division promotions were announced by Mr. Culpepper. Harold R. Dinges, formerly director of product sales, was named assistant general sales manager; George V. Taylor, director of sales development, has become director of product sales; and E. W. Segebrecht, assistant to the general sales manager, has been named director of sales development.

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AAFCO Meets Oct. 15

The eighth annual convention of the Association of American Fertilizer Control Officials, will be held October 15 at the Shoreham Hotel, Washington, D. C. The following reports are included in the one-day program:

Address by President, Henry A. Davis, Durham, N. H.

Address, Dr. Russell Coleman, President National Fertilizer Association.

Address, Paul T. Truitt, President American Plant Food Council, Inc.

Public Relations, Rodney C. Berry, State Chemist, Richmond, Va.

Non-Farm Consumption of Fertilizers in 1952-53, Walter Scholl and Hilda M. Wallace, U. S. D. A., Beltsville, Md.

Fertilizer Placement, Dr. A. L. Nelson, In Charge, Soil Fertility Research, N. C. State College, Raleigh, N. C.

Warning and Caution Statements, John D. Conner, Attorney, National Agricultural Chemicals Association, Wash., D. C.

Report of Investigators

General Terms, M. H. Snyder, Charleston, W. Va.

Nitrogen Products (Organic), M. P. Etheredge, State College, Miss.

Nitrogen Products (Inorganic), J. W. Kuzmeski, Amherst, Mass.

Phosphorus, J. F. Fudge, College Station, Tex.

Potash, R. W. Ludwick, State College, New Mex.

Calcium and Magnesium and Manganese, J. B. Smith, Kingston, R. I.

Boron, R. C. Berry, Richmond, Va.

Zinc and Copper, Gordon Hart, Tallahassee, Fla.

Mixing and Segregation, M. B. Rowe, Richmond, Va.

Registration Forms, John L. Monaghan, Topeka, Kan.

Publications, W. S. Thompson, Reynoldsburg, O.

Specimen Labels, F. W. Quackenbush, Lafayette, Ind.

Tonnage Reports, Parks A. Yeats, Oklahoma City, Okla.

Pesticides in Fertilizers, A. B. Lemmon, Sacramento, Calif.

Specialty Fertilizers, E. A. Epps, Jr., Baton Rouge, La.

Systemic Insecticide-Fertilizer Under Test

INTENSIVE field testing of its systemic insecticide - fertilizer, "Ferttox," is being continued this season by International Xray, Inc., Mobile, Ala., according to Dr. H. L. J. Marshall, president of the company. He reports that the company's pilot plant in Pensacola, Fla., has been expanded, and that first commercial manufacture of the material has been started this season by Mid-south Chemical Co., Memphis, Tenn. Their territory for sale of the product will embrace Alabama, Arkansas, Kentucky, Louisiana, Mississippi, Missouri and Tennessee. The states of Texas and Florida are being served by Jerry Lee Chemical Co., Pensacola, Fla., who also operate the company's pilot plant.

Dr. Marshall, developer of "Ferttox," advises that the product is a concentrate which can be mixed with any fertilizer formula and applied to the field in accordance with normal practice, without special equipment.

According to Dr. Marshall, the material is a reacted compound containing a number of metallic complexes of cyanides.

In tests on cotton conducted by the company during 1953, they report that damage from boll weevil was minimized, and substantially increased yields were obtained. These tests have not, however, so far as we have been able to determine, been confirmed by independent agencies.

The additional claim is made for the product that it renders the soil toxic, and thus it may be effective in the control of nematodes. Dr. Marshall advises that "the State Experimental Station near Mobile is undertaking an extensive research program on the subject." However as yet there has been no report from this station as to its findings, if any.

The company advises that highly successful tests were conducted during the 1953 season on seven one-acre test plots by the Mid-south Chemical Company and on a Florida plot conducted by the Jerry Lee Chemical Co., and reported supervised by the county agent there. Both companies are of course connected with commercial distribution of the product.

International Xray Inc. developed the product and have applied for patent registration. The product and the process, Dr. Marshall advises, will be assigned to Ferttox Associates of the International Xray, Inc. It is contemplated that franchises will be granted to manufacturers in exclusive territories to manufacture and distribute the concentrate. Franchise holders, in turn, will sub-license local mixing plants and supply them with the concentrate.

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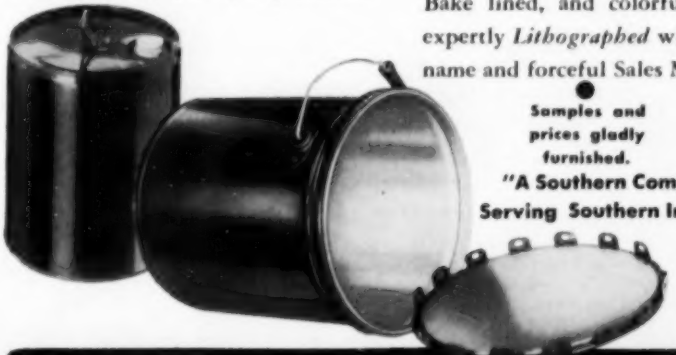

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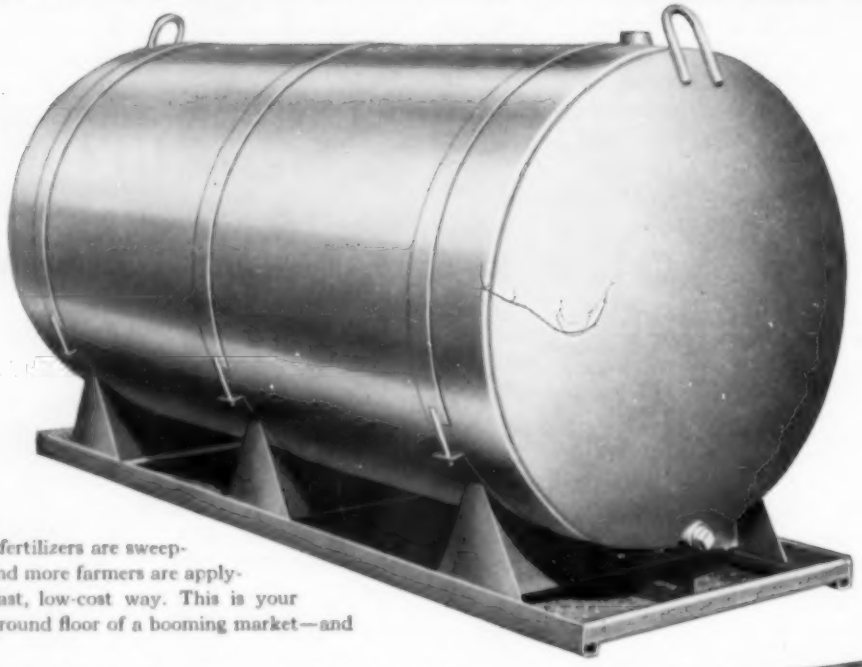

Welded low-pressure skid tank for on-farm storage. Available in 500, 830 and 1000-gallon capacities. Others (without skids) from 100 to 1000 gallons.

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Butler now offers two types of special alloy non-corrosive aluminum bulk storage tanks for nitrogen solutions: (1) Bolted vertical 22,000-gallon tanks for non-pressure solutions; (2) Welded horizontal 12,000 and 22,000-gallon bulk storage tanks for low-pressure solutions.

Smaller size horizontal aluminum tanks in 100, 270, 500, 830 and 1000-gallon capacities are also available. The 500, 830 and 1000-gallon tanks can be factory-equipped with skids for on-farm storage or transporting solutions from bulk station to farm.

Act now and cash in! Send coupon today for full information.

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New Crop-Dusting Plane

A NEW aircraft specially designed for use by custom sprayers has recently been developed by Transland Company, El Segundo, Calif., with five of the new planes now in the parts fabrication stage. Called the Ag-2, the new ship incorporates many of the safety and performance features which characterized the Ag-1, first airplane specifically designed for crop spraying and dusting operations. However numerous improvements have been made. For example the Ag-2 liquid capacity is 250 gallons, as compared to the 150 gallons of Ag-1, and hopper capacity for dusting operations is 53 cubic feet (2,000 lbs. of low density material) as compared with the 27 cubic feet capacity of Ag-1. Prof. Fred E. Weick, under whose supervision the Ag-1 was built at Texas A. & M. College, is serving as consultant on the Ag-2 project, assisting George S. Wing, president of Transland, and Nelson M. Rogers, project engineer, under whose direction the Ag-2 was designed.

The essential feature of the plane is that it was designed about the applicating equipment. Separate systems are provided for dispersal of solids or liquid spray operations. The hopper is located in the forward fuselage, and the tanks for liquids in the wing. The pilot controls both from the cockpit by a single control lever, with a simple clutch mechanism being provided to allow either system to be put in operation.

The plane is of all-metal construction, employing aluminum alloy sheet metal parts wherever possible, and avoiding compound curves, forged fittings and castings. All internal structure is zinc chromate primed or otherwise protected with finishes resistant to corrosive agricultural chemicals.

The Ag-2 is powered by a 450 H. P. Pratt - Whitney Wasp R-985 with a Hamilton Standard two-position propeller. The engine exhausts to the side over the wing, away from dust and spray discharge areas, thus minimizing explosion hazards. Ample reserve engine power is available to aid in clearing obstacles at the ends of rows, and to reduce turn-around time. As on the Ag-1, the wing, with its NACA 64021 airfoil and full-span slotted flaps, provides exceptionally high lift.

The spray system is operated by an engine-driven spray pump. Non-corrosive plumbing, routed externally to the spray nozzles along the wing trailing edge, prevent leakage of corrosive liquids to internal structure. Full-span flaps provide a turbulent air downwash to assist in obtaining maximum penetration of insecticide into foliage. Dust dispersal is controlled through a rotary gate which is said to provide precise metering of flow. Pattern and swath width are controlled by adjustable vanes. An aerosol fogging system developed by the Transland Company is also available for installation.

Pilot safety, as in the Ag-1, was a prime consideration in design of the ship. Maximum visibility is provided and the structure of the plane was designed for progressive energy absorption in the event of a crash. Engine, wing and fuselage would absorb the crash shock progressively, protecting the cockpit area. Other safety devices include a turnover structure, over-the-cockpit wire deflectors and wire cutting blades attached to the landing gear.

Light wing loading, plus high maximum lift coefficients, are said to permit full payloads at safe operating speeds. With a gross weight of 5200 lbs., and a payload of 2000 lbs. the

Ag-2 is said to be of optimum size for most crop dusting and forestry operations.

The plane is priced at approximately $15,000 complete, although it is possible for the buyer to reduce this amount by bringing in a BT-13 airplane for parts removal; or he may buy the G-2 airframe, less the BT-13 parts, and can assemble the plane himself with his own BT-13 parts.★★

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Natl. Distillers Ammonia Plant

National Distillers Products Corp., New York, has just announced plans to expand the capacity of a new ammonia plant it has under construction at Tuscola, Illinois. Originally designed to produce 50,000 tons of ammonia per year, it has been decided to increase capacity to 60,000 tons per year. The plant will go into production early in 1955, operating first at a rate of 35,000 tons per year, and is expected to reach the 60,000 ton rate by mid-55. Seventy to eighty per cent of output will be marketed in the form of ammonia solutions, and the balance as anhydrous ammonia for direct application to the soil or for industrial uses.

National Distillers, which recently disposed of its U. S. I. insecticide division to Food Machinery & Chemical Corporation, has indicated that this and other previous sales of other divisions does not indicate any lessening of its interest in the chemical field, but should rather be interpreted as part of a program to withdraw from fields in which the company does not enjoy a strong basic position on raw materials, and to concentrate instead on an integrated set-up on basic products where the company has natural advantages over competition.

Among the fields in which National Distillers expects to continue and expand its future operations is in the supply of raw materials for the fertilizer industry. In addition to the new ammonia plant under construction at Tuscola, the company also has three sulfuric acid plants in operation, with a capacity of 900 tons of sulfuric acid per day, much of which goes into fertilizer. These include two older plants at Dubuque, Iowa and Sunflower, Kansas, and a new plant at Tuscola which went into production less than a year ago.

In line with its avowed intention of becoming a major factor in the midwestern agricultural chemical picture, National Distillers has also acquired the Hegeler Zinc Co., of Danville, Ill., by exchange of stock. National will further expand Hegeler's sulfuric acid plant, which produces 77% sulfuric acid, integrating it with the three existing plants. It is emphasized that National's policy will be to produce raw materials for the fertilizer industry and not to produce finished fertilizers for resale.

•

Agronomists Meet Nov. 8-12

The American Society of Agronomy will hold its annual meeting November 8-12 in St. Paul, Minn. Meetings will be held in the hotels St. Paul and Lowry.

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NEWS Brevities

RITNER W. TOMLINSON succeeds Frank J. Power as superintendent of the Pennsylvania Salt Manufacturing Co. Calvert City, Ky., plant. Mr. Power replaces the late George Boyce as area superviser in the Wyandotte, Mich., works, according to William P. Drake, president of the industrial chemicals division of the company

•

SALES MANAGER of the newly-created Flexible Packaging Division of Arkell & Smiths is Ernest H. Heath Jr. The division was formed to handle output of a recently-acquired plant at Hudson Falls, N. Y.

•

THE ANNUAL Aroostook County Field Day was to be held Aug. 24 at the Aroostook Farm of the Maine Agricultural Experiment Station, according to Owen H. Smith, Presque Isle, president of the Aroostook County Extension Association.

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JOHN R. CLEMENTS, formerly midwestern sales manager now is sales manager of the Multiwall Bag Division of Albermarle Paper Co. Rufus Roberts, formerly sales coordinator in the home office in Richmond, is his assistant. The office is in Chicago.

•

A NEW research laboratory for General Chemical Division of Allied Chemical & Dye Corp. was opened last month in Morris Township, N. J., replacing a smaller unit at Laurel Hill, Long Island, N. Y. New address is P. O. Box 405, Morristown, N. J.

•

THE NATIONAL Pest Control Association, Inc., will hold its annual convention Oct. 18-21 at Miami Beach, Fla. Headquarters will be held at the Hotel DiLido.

DAVISON CHEMICAL CO., Division of W. R. Grace & Co., opened a new office reecntly, in Houston. John Benedict was transferred there from Baltimore and C. V. Bolles was transferred from Lake Charles, La., to the new office.

•

BERNARD WOLNAK, who worked on development of the fertilizer, Milorganite, has opened a business called Mid-West Laboratories at 1952 W. Irving Park Road, Chicago. The laboratories will be devoted to research, development and consulting in the chemical and biochemical fields.

•

RECENTLY incorporated in Spartanburg, S. C., was Caldwell's, Inc., chartered with authorized capital stock of $100,000 to manufacture fertilizer and mixed feeds. James B. Caldwell is president.

•

SMITH-DOUGLASS CO. announces that W. B. Copeland has been elected executive vice president and S. L. Lott, treasurer and controller of the company.

•

SUPER-PLANT Crop Foods, Inc., soon will start fertilizer production at Ottumwa, Ia., according to David Carpenter, one of the founders.

•

E. G. WAGNER, of Calumet City, Ill., has been moved up to the staff of Swift & Company's research laboratory, plant food division, at Calumet City. He joined the company in 1949, and was a superviser at the Wilmington, N. C. plant food division before the transfer.

•

EUGENE J. GERBERG, president of Cornell Chemical and Equipment Co., Inc., of Baltimore, received a doctorate degree from the University of Maryland at the conclusion of the

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EXPORT-IMPORT

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summer session. His thesis concerned the destructive bug, the powder post beetle.

•

DR. J. C. PULLMAN is working with commercial development of new uses for acrylonitrile and its derivatives after his appointment as manager of technical service for American Cyanamid's Petrichemicals Department. He was formerly assistant to the manager of the new product development department.

JOHN R. MCLAREN is new sales manager for Bell Clay Co., Gleason, Tenn.; Bell Minerals, West Paris, Me.; and Bell Kaolin Co., Batesburg, S. C. He will contact insecticide manufacturers for the latest Bell product, kaolin.

•

WYANDOTTE'S Charles F. Sanborn, in the Michigan Alkali Division, has been moved up to senior sales representative in the company's eastern district office, New York.

A NOVEL insecticide package has been developed by Renflo Chemical Co., Islan Park, N. Y. It's a water soluble plastic sack containing insecticide developed for the home gardener. You just drop the sack into a gallon can, add water and the sack disintegrates, mixing the insecticide with the water in the proper proportion. The manufacturer claims the material is effective against a wide variety of pests.

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A COMBINATION service station and fertilizer store reports it is doing very well in Rockport, Mo. The unit is operated by the Atchison County Cooperative Association, which was organized in March.

•

ONE of the new resident directors of the Long Island Rail Road, following recent reorganization, is George Cushman, treasurer and general manager of Long Island Produce & Fertilizer Co., Inc.

•

GEORGE RIEGER, of Wilmington, Del., will coordinate market research activities of Diamond Alkali Co.'s recently formed Commercial Development Department. C. A. Butler, Jr., director of Commercial Development, announced the appointment.

•

PENN CHEMICAL CO., Amarillo, Texas, has just been purchased by Western Grain & Supply Co. Included in the deal was the local franchise for the Reasor-Hill line of agricultural chemicals.

•

SCHROCK FERTILIZER SERVICE has opened a mixing plant in Bern, Kansas, which will turn out a line of liquid fertilizer mixtures, sold under the trade name, "Schrock Liqui-Blend."

•

THE MAN who helped develop Crag Herbicide and Crag Fungicide for Union Carbide and Carbon Corp., Dr. D. M. Yoder, has been appointed head of the Biological Research Department of the Carbide and Carbon Chemicals Co. division. He will be responsible for research work on the company's line of agricultural chemicals.

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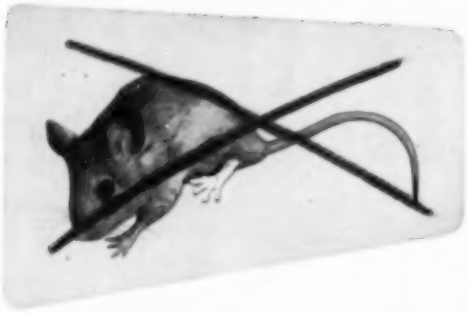
What's new in Naugatuck ✳



PHYGON® promises more benefits—as rodent repellent... mint fungicide

As a seed protectant, Phygon has delivered many marketable benefits to growers of alfalfa, beets, corn, peas, pepper, rice, sorghum, spinach, swiss chard, tomatoes. Now, according to U.S. Fish and Wildlife Service, stored Phygon-treated seed has mouse-resistant properties.

As a fungicide, Phygon-XL has proved equally successful in improving such crops as apples, peaches, cherries, tomatoes as well as many ornamentals. Now it has solved a long-standing peppermint oil problem by providing excellent control of mint rust *without leaving undesirable residue in the oil extract.*

Naugatuck is proud of these two new additions made to Phygon's remarkably versatile list of accomplishments.

✳ One in a series of advertisements demonstrating Naugatuck's continuing effort to introduce new and better products for agricultural and related uses.

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producers of seed protectants, fungicides, miticides, insecticides, growth retardants, herbicides: Spergon, Phygon, Aramite, Synklor, MH, Alanap.

ACS MEETING

(*From Page 53*)

Toxicity Study of a Grain Fumigant. *V. K. Rowe, R. L. Hollingsworth, and D. D. McCollister, Biochemical Research Department, Dow Chemical Co., Midland, Mich.*

Dowfume EB-5 is a fumigant mixture commonly used for the fumigation of grain in storage. It consists, on a weight basis, of carbon tetrachloride, 63.6%; ethylene dichloride, 29.2%; and ethylene dibromide, 7.2%. Information was needed which would allow an evaluation of the hazard to health of the fumigator and to stock fed treated grain.

The administration of single oral doses to rats, guinea pigs, rabbits, and chicks yielded LD_{50} values ranging from 280 mg. per kg. for male guinea pigs to 780 mg. per kg. for male rats and chicks. Direct contact with the eyes of rabbits caused moderate pain and conjunctival irritation but no lasting injury.

Skin contact studies with rabbits showed the material to cause rather severe burns if confined to the skin and that the material could be absorbed in toxic amounts if exposures were extensive and prolonged. The LD_{50}, using a modified "Draize" technique, was about 1000 mg. per. kg.

The results of acute vapor inhalation studies on rats may be summarized as follows:

Duration of Exposure, Hours		
Vapor Concentration, p.p.m.	*Expected to Cause 50% Mortality*	*Maximum not Causing Detectable Injury*[a]
10,000	0.34	<0.1
5,000	0.75	<0.1
2,000	2.0	<0.1
1,000	4.2	0.17
500	9.0	0.5
200		2.0
100		7.0
80		7.0

a) Based on organ weight and histopathological changes in the liver.

Hogs, chickens, and cattle have been fed freshly fumigated grain without adverse effects.

Chlorobenzilate, an Effective New Acaricide. *C. C. Alexander, Geigy Agricultural Chemicals, Bayonne, N. J.*

Chlorobenzilate, 2-hydroxy-2, 2-bis (4-chlorophenyl) ethyl acetate, was synthesized by Haefliger in the laboratories of J. R. Geigy, S. A., Basle, Switzerland. Laboratory tests in Switzerland and United States proved it to be an effective acaricide having residual properties.

Beginning in 1951, rather extensive field tests have been conducted in many parts of this country. Chlorobenzilate sprays containing either wettable powder or emulsion concentrate formulations were

effective in controlling various species of mites on many agricultural and horticulture crops. No insecticidal properties were observed. Phytotoxic effects were noted on some species of stone fruits, particularly following early season applications.

The Schechter-Haller colorimetric method of analysis for DDT has been adapted for the determination of Chlorobenzilate. A number of analyses show that there is little residue present on food crops following practical applications for mite control.

Chlorobenzilate exhibits relatively low toxicity to warm-blooded animals. Studies indicated that when fed to dogs, Chlorobenzilate was found to be excreted within 2 or 3 days.

Additional abstracts of papers on insecticide topics will appear next month. Following are titles of some of the papers to be presented before the Fertilizer and Soil Chemistry section. Sorption of Surface Active Agents from Aqueous Solution by Phosphate Rock. E. J. Fox and W. A. Jackson; Evaluation of Surfactants for Use in Fertilizer Manufacture. F. A. Retzke, G. F. Sachsel, and R. B. Filbert, Jr.; A Plant Scale Controlled Experiment Using Surface Active Agents in Mixed Fertilizer Manufacture. W. J. Tucker; Some Effects of Surface Active Agents in Mixed Fertilizers. Rikio Kumagai and J. O. Hardesty; Drying of Ammoniated Superphosphates and Mixed Fertilizers. G. L. Bridger and H. A. Burzlaff; Surface Area of Natural and Processed Phosphates. W. L. Hill, J. H. Caro, and G. A. Wieczorek; Effect of Particle Size Upon the Ammoniation of Superphosphates. C. E. Waters, W. W. Arnold, and W. H. Payne; Pilot-Plant Production of Diammonium Phosphate Fertilizer from Wet-Process Phosphoric Acid. E. C. Houston and L. D. Yates; The Manufacture and Properties of Liquid Fertilizers. Peter G. Arvan and Robert P. Langguth; Chemical Basis for Soil Testing. J. Fielding Reed; Essential Supplemental Tests for Soil and Plant Diagnosis. Jackson B. Hester; Difference in the Relative Response of Calcium Accumulating and Silicon Accumulating Crop Plants to Potash Fertilization. H. P. Cooper; Problems Relating to Trace Elements. A. A. Nikitin and Julia P. Goode; The Value of Leaching Frames in Fertilizer Usage, J. B. Hester.★★

N. J. EXP. STATION

(*From Page 52*)

crop insecticides; DDT residues; effect of benzene hexachloride on plants; spray residue studies; study of organic arsenical compounds as insecticides, etc.

Investigations on varieties of sweet corn susceptible to corn borer showed these varieties to be also susceptible to corn smut; and the use of ryania for corn borer control was found also to reduce corn smut. Fruit insect studies showed parathion to give good control of the red banded leafroller, and TDE to give fairly good control of this pest. Further tests are being made along this line, using Ovotran. Parathion is found to be effective in control of the oriental fruit moth on plum curculio; and heptachlor and endrin are reported to give favorable results in the control of alfalfa weevil.

Improved methods of application of insecticides are being tried at the New Jersey Station, and it is pointed out that adaptation of the mist blower might very well broaden the use of insecticides by nurserymen and small growers.

Although experiments and trials are still in an early stage in soil fumigant experiments, favorable results have been obtained with ethylene dibromide and with a DD mixture. The latter is reported also to be a good nematocide.

Besides the many agricultural insecticide experiments under study, the entomology department is concerned also with studies on control of household pests, personal repellents, bee investigations, tick repellents, etc.

Still other departments working closely with the various divisions reviewed thus far in this summary of N. J. research, are complete departments for agricultural engineering, animal husbandry, chemistry, biochemistry, the dairy industry, forestry, microbiology, poultry husbandry, sanitation, wildlife, etc. Where, required, projects are referred to for

for Sale . . .

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further specialized testing in related phases of investigation to specific departments.★★

THE TRADE REPORTS

(*From Page 39*)

The picture has varied from area to area and from company to company, but generally new product sales were less than anticipated. This is the second year that there has been a reduction in the rate of expansion of the total market so we have also had more competition between the insecticides. The newer insecticides have cut into markets once controlled by the older, more established products such as DDT and BHC, without significantly increasing total sales.

Inventories are very difficult to determine accurately because of the industry's variable sales terms and complicated methods of distribution. However, it is safe to estimate that they exceed those of 1953. This appears to be true in both the numbers of products and tonnages. It is doubtful that there will be any substantial movement during the next few months. As a result, profits which appear to be higher for the first nine months, may be lower at the year's end, when final field and warehouse stocks are reported.

Obviously we have no control over variables such as climate and insect infestation. We can, however, have a more definite sales policy combined with an actual selling program. This along with the realization that term of sales are a definite part of any stable price structure will help to give us a clearer picture of our inventory movements from month to month, as well as resulting profits.

Contrary to the above, we are pleased to report that specialty products have shown a marked increase over previous years. Inventories are not excessive, and in some cases are below normal. Malathion is perhaps the outstanding example for 1954. However, we have also noted an increased demand for rotenone, pyrethrum, chlordane and lindane - as well as some of the fungicides. It is interesting to note that all of these products are of modest tonnages in comparison with DDT and BHC, and that they all fall into the same category of controlling a wide variety of insects over a wide area, thus being less susceptible to localized weather conditions.

This increase in sales is due, in part, to the formulator's realization that large-tonnage, one-crop insecticides are always subject to the unpredictable fluctuation in movement such as we have experienced from 1951 to 1954. As a result, the manufacturer in a search for a more stable market has found that the so-called specialty products are not only stabilizing — but profitable.

Better Than Normal on West Coast

By E. S. Heckathorn

United Chemical Co.
Richmond, Calif.

THE market on the West coast for the 1954 season seems to be ahead in dollar volume. The exact percentage over last year, of course, we do not know yet but there is a wide variation in sales in different areas.

The citrus area in Southern California looks as if it is about 25% below last year's sales due to lack of scale, mite, and thrip infestation.

San Joaquin Valley is using more material than last year, with the west side of Fresno behind last year. The Wheeler Ridge and Arvin areas are experiencing an unusually active season. In general, however, the whole San Joaquin should be way above last year.

Sales in the Salinas Valley and the Sacramento Valley are down due to the cool weather.

Sales in the Imperial Valley will be about 10% to 15% ahead of last year.

Sales in the Pacific Northwest are below last year, particularly on weed killing compounds.

Sales in Arizona will about equal last year in spite of the cuts in cotton acreage.

DDT, Malathion, Toxaphene, Aldrin, Dieldrin, Endrin, Aramite, and Captan seem to be on the increase in the area while the following compounds seem to be on the decrease: Parathion, BHC, oil sprays, Ovotran, 2,4-D, TEPP, Systox, and DDD.

Collections on accounts receivable seem to be above average for this time of year and inventories are extremely low. We have experienced a number of temporary shortages on raw materials. Altogether, it looks like a better than normal year for the West Coast.

1954 A Much Healthier Year

By Sam Marshall

Central Chemical Corp.
Hagerstown, Md.

I am happy to report that a much healthier condition prevailed in connection with our insecticide operations this current season than during 1953.

Our eight plants are located from Virginia to northern New York state and serve both fruit and vegetable growers. Movement of spray materials was steady from February 15th to August 1st. Supplies were adequate at all times for practically all materials with the exception of Captan, which enjoyed a vigorous demand. Prices were mostly firm, with very little cutting from distress stocks. Although profits could have been better, they were a great improvement over the past eighteen months and our operation was in the black.

Because of previously burdensome stocks, we adopted a close buying pattern and recommended that our customers do the same. For this reason, we are in a favorable inventory position at this time and feel that the material we sold during the year has been *consumed* and will not be on hand next season. All factors considered, it was a normal year.

Where Do We Go From Here?

This Contributor Prefers
Not To Be Identified

ANY profitable discussion of our industry must recognize the fact that we have come to a dead end. No longer can we squirm and twist, blaming our many ills on the vagaries and unpredictability of Mother Nature. Passive resistance and wishful thinking are not enough. Positive action must be taken,—and soon, to save the industry as a whole from individual or collective bankruptcy.

Space does not permit the discussion of all the steps that come to mind for the over all good of the industry. So let us confine ourselves to two very prevalent practices which, when analyzed very carefully, offer no future whatsoever except for long term hari-kari.

The insidious practices referred to are those of utilizing the ginners and/or the oil mills and also the wholesale grocers for the purpose of distributing agricultural insecticides. Referring to the cotton ginning-oil mill group; - How many industries do we know of that cultivate a non-profit source of distribution for large

Work Safely!
Wear A Respirator!

Every agricultural worker exposed to toxic insecticides such as Parathion, TEPP, Systox, Aldrin, Toxaphene, BHC, Chlordane, etc., should wear a respirator. Some of these are almost odorless—others are nauseating—ALL ARE TOXIC!

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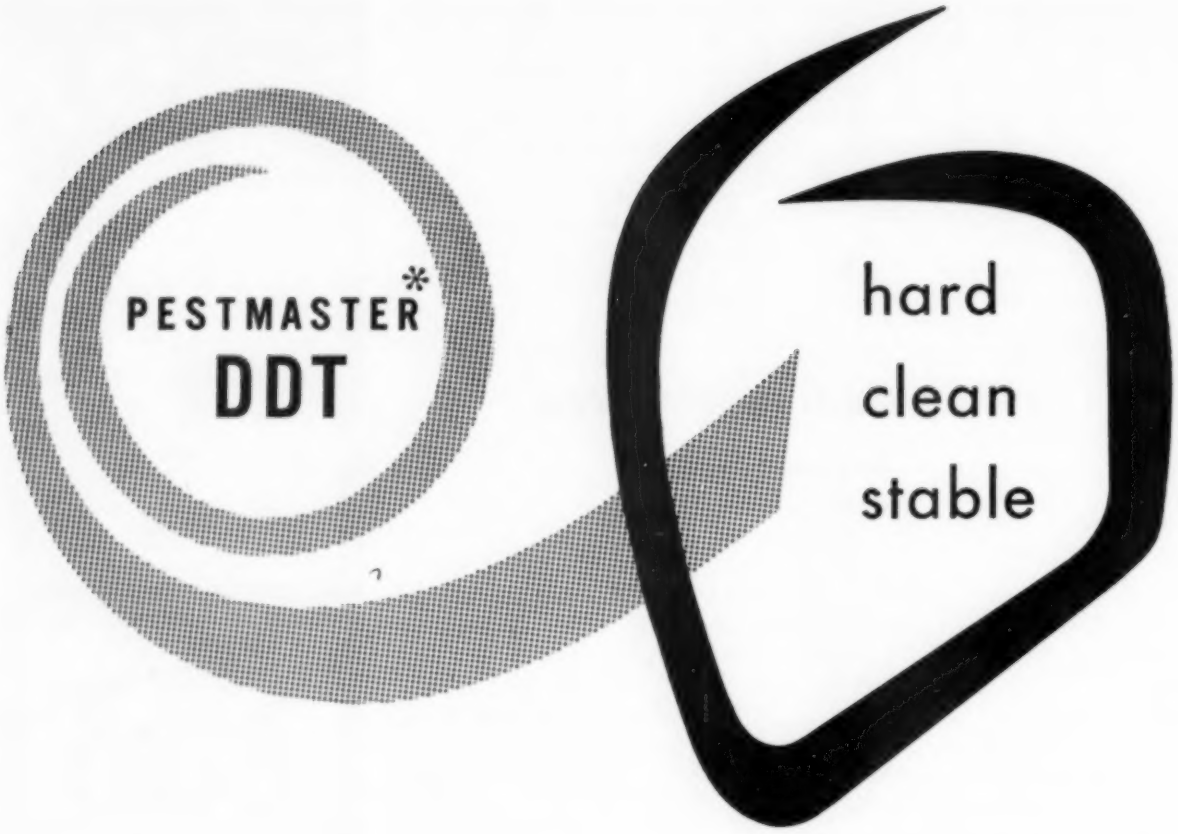

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PESTMASTER* 75% AND 50% DDT WETTABLE POWDER AND DUST CONCENTRATES. The wettable formulations have quick wetting properties, and are intimately and uniformly blended with the carrier. Their unusual quality is in their excellent suspension properties. They remain uniformly in suspension. The 75% Wettable powder is made to World Health Organization specifications, and *has been especially designed to withstand severe tropical conditions of use and storage.*

PESTMASTER* 25% DDT EMULSION. Here is a 25% emulsion with low phytotoxic qualities that reduces to a minimum the danger of burning foliage when used properly, and emulsifies in water of any degree of hardness. It emulsifies quickly and meets all quality standards.

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scale movement of their products? The very foundation of business itself is operating at a profit, so what are we doing selling cotton dusts to anyone using these products as a gimmick or ruse for influencing the farmers to bring in their cotton? The business man who is the farmer's regular source of supply, must be in a position to compete with this no-profit sale in his area, but when his price is adjusted, the ginner and oil mill operator must also get a lower price - so the vicious cycle starts which culminates in red ink figures for both the manufacturer selling to the give-it-away people and also for the other manufacturers not selling to the ginner-oil mill group, who are forced either to meet the competition established by them or to sit on their merchandise.

Now for the wholesale grocer group; - They are not quite as bad as the first group mentioned in that they do sell at a profit. But it is common knowledge that the wholesale grocery industry operates on a very small percentage and it is only the large volume of merchandise they handle, that keeps them in the black. Their trucks have to make regular routes two or three times a week, so why not deliver cotton and tobacco dusts too, on a free ride? But the regular merchants and suppliers of insecticides offer far more to their customers than a delivery. They don't have other merchandise "going anyway" and, accordingly, find it extremely difficult to sell insecticides at a profit margin similar to that on which grocers can operate.

Moreover, isn't the agricultural insecticide industry virtually holding on to a slow fuse time bomb by inviting wholesale grocers to distribute insecticides? No intelligent insecticide manufacturer, knowing the hazards of most of the products, would consider storing them in his own pantry along side food products. But what happens on the delivery trucks? - Bags of dry insecticides, cases and drums of liquids stored along side of, on top of, or underneath flour, sugar, salt and all conceivable types of food products, violating all the rules governing storage of insecticides.

These certainly represent two of the major weaknesses in over all insecticide distribution. Distribution is part of the lifeblood of the industry, therefore any improvements in distribution methods are bound to help the ailing patient materially.

The facts presented herein sum up briefly as follows: - Distribution of agricultural insecticides would be improved immeasurably by the elimination of the ginners, oil mill operators and wholesale grocers. Certainly with this accomplished, the ailing patient would be in a far better position to get both feet planted firmly on the ground.★★

PEST CONTROL, LTD.

(*From Page 105*)

2,4-D are commonly used on sorghum.

Coffee is one of the main crops of Kenya, and in protecting the coffee plants, DDT is used to control thrips. The systematic, "Hanane," known also as "Dimefox" (bis dimethyl fluoro phosphene oxide) has been found effective against mealybugs, but the preferred method is to control the mealy bug tending ants by a soil treatment with chlordane. Copper sprays reduce Hemalaja and Colletotrichium) both fungus diseases of the coffee plant.

In Central Africa and Southern Rhodesia, agriculture centers on corn and tobacco. Ethylene dibromide is used against the rootknot eelworm in the tobacco seedbeds, and chlordane protects against soil pests. As in East Africa copper sprays are in use to relieve fungus diseases. The large cattle ranches of Northern Rhodesia and South Africa require protection against ticks, and to this end, DDT BHC and toxaphene are in most common use, following the development of tick resistance to arsenite spray and dips.

Of the three species of bollworm: American, Sudan, and Spiny, the Sudan bollworm presents the greatest problem in the Union of South Africa, since there is no satisfactory means of control of this pest at this time. DDT is effective against the American bollworm, and endrin is adequate against the Spiny bollworm. Research is of course underway to discover satisfactory protection against the Sudan bollworm.

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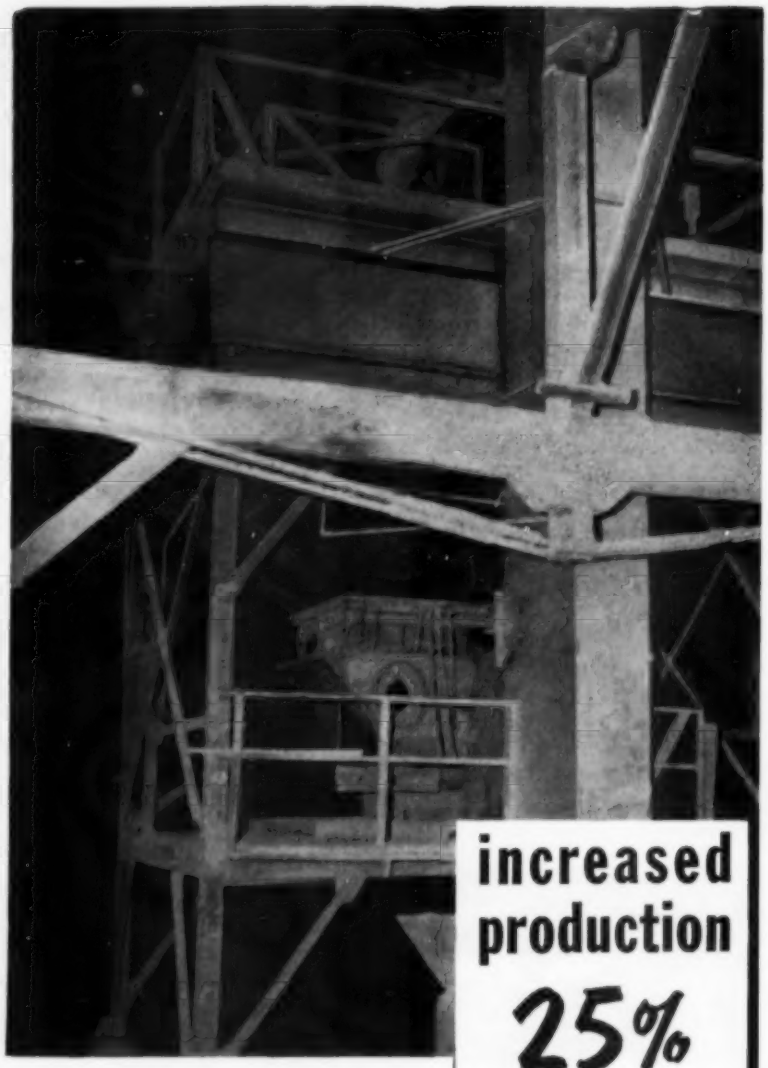

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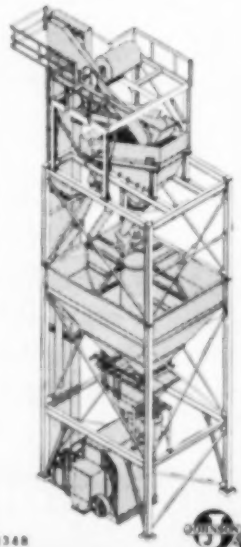

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J348

Pests of the very sizable citrus industry of this area are primarily thrips, red scale and mites. DDT emulsions are in commercial use against the thrips, while parathion controls both mites and red scale. A DDT and parathion combination is used against the coddling moth in deciduous fruit production, while carbamates, such as dithane and captane are used to control scab.

The Tse Tse fly, is a very dangerous pest in view of its role in transmitting sleeping sickness in humans, and the ngana disease in cattle, and also makes vast areas unsuitable for cattle although recent experiments have shown ways to control Tse Tse fly by chemical means. Dr. Ripper pointed out that large scale experiments by the South African government in swamp land and by a research team of the Colonial Insecticide Committee has shown that DDT space sprays applied by aircraft readily reduce the pest to insignificant numbers. The infested areas are so extensive that a control campaign covering the affected territory would require resources beyond those of the infested countries.★★

FERTILIZER CONF.

(*From Page* 49)

of the elements N, P, K, B. Cu, Mn, and Zn on hay fields, only nitrogen and phosphorus were found to give a positive yield response.

T. L. Jackson, Oregon State College, Corvallis, Ore., also discussed fertilizer reponse, and reviewed experiments with grains and grass seed crops. According to Mr. Jackson, barley response to nitrogen varied according to soil conditions. Similarly, crop response to phosphorus was not general, but depended on phosphorus levels of the soil.

The fertilizer testing program in Idaho was outlined by G. O. Baker, Univ. of Idaho, Moscow, Ida., who listed the following results of pasture study in the Boise Valley:

1. The use of phosphate increases the clover in the pasture.
2. Nitrogen increases total yield for the year.

3. Five monthly applications of 20 pounds of nitrogen beginning about May 1 did not change the total yield as compared to a single fall application of 100 pounds of nitrogen but did result in a more uniform yield throughout the season.

H. P. Singleton, Irrigation Experiment Station, Prosser, Washington, reviewed the new outlying testing program in Washington, which serves as a connecting link between the experiment station and the extension service.★★

LISTENING POST

(*From Page 81*)

such states as Mississippi, Tennessee and Arkansas reporting very low infestations for the week ending August 6. It appeared at that time that the infestation in Oklahoma was the lightest since 1936.

On the other hand, by the middle of the month injurious infestations of bollworms were occurring in many areas where cotton remained succulent. Mississippi, Louisiana, Texas and Arizona were showing increases, and the bollworms were reported to be the major problem of most cotton farmers in Arkansas. Cotton leafworm specimens were also being taken at this time in Louisiana, Arkansas, Oklahoma and New Mexico, but the spread of this defoliator had not been as great as in 1953 and very little economic damage had been recorded. A report of gin trash inspections for the pink bollworm in the lower Rio Grande Valley of Texas stated that the infestation was low compared with the average of recent years and up to the first week of August there had been no report of commercial damage in the lower valley counties.

A brown cotton leafworm (*Acontia dacia*) has been found causing considerable damage to cotton in south central, eastern and upper coastal areas of Texas. The insect caused considerable ragging of cotton in these areas and over 5,000 acres were treated. Although this insect was collected on cotton in 1953 in Texas, this year's infestations are the first to cause economic damage as far as can be determined.

Important New Records

A SINGLE adult Mexican fruit fly was trapped August 9, 1954, in a grapefruit tree in the City of San Ysidro, San Diego County, California. This collection, the first in California, was made about one mile north of the international border. Mexican fruit flies have been found for the past several months south of the border in Baja, California; therefore, the discovery was not unexpected, and county, state and federal agricultural authorities moved rapidly to make effective previously planned programs for control of the fly. Mexican fruit fly is the main citrus-infesting fruit fly of Mexico. It destroys large quantities of fruit in Mexico and Texas where it migrates annually. The fly is not a tropical insect, and therefore can build up a population and infest fruit under varied temperature conditions. The San Ysidro specimen was collected in a planting of 17 trees, including peach and orange trees. White sapotes and citrus fruits, except lemons, are preferred hosts; however, it freely attacks several other fruits including apples, peaches and pears.

The European chafer, a destructive pest of turf, was collected in West Virginia for the first time in June 1954. Adults were taken in traps and in flight in Hampshire County near Capron Bridge. The insect, which is known elsewhere in the United States only in western New York and at Meriden, Connecticut, was apparently introduced into the West Virginia area through a shipment of balled nursery stock. Additional infestations were also discovered recently in the western New York area at Buffalo, Niagara Falls, Elmira, Syracuse and Liverpool.★★

EXPORT MARKET

(*From Page 60*)

exports. There have also been some rather sharp declines, as statistics compiled by Dr. Harold H. Shepard, Commodity Stabilization Service, U. S.D.A. and included in table form

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- Establishes a new procedure for setting residue tolerances.
- Limits the amount of pesticide residue permitted on raw agricultural commodities.

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NATIONAL AGRICULTURAL CHEMICALS ASSOCIATION

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in this article, show. Dr. Shepard's analysis reveals that exports of pesticides have dropped as much as 14 million dollars since the peak year of 1951. These tables also show where exports go and their dollar value.

Your attention is also called to another table (pg. 143) compiled by Dr. Shepard showing dollar value of pesticide exports in terms of various materials. These two tables give a better picture of what materials are in greatest demand and where they are going.

Fertilizer exports have also fluctuated considerably since the war, and the two fertilizer associations are keeping in close touch with the situation. One of the big problems with fertilizer exports is that essentially, exports are of low value per pound, making the problem one of bulk handling of materials. Shipping costs then become one of the sticky problems.

The other extreme in the export picture is a commodity which requires virtually no space and has practically no weight . . . the export of money. This approach is being considered by both business and government. It is a realization in part at least that there is little hope of entirely bridging the dollar gap. Hence, exports are limited to the dollars other countries can earn here, plus the dollars the government gives them to spend here.

Area and Country	1949	1950	1951	1952	1953[2]
Korea	385	—	—	317	265
Lebanon	44	51	105	149	59
New Zealand	316	70	371	119	29
Pakistan	57	51	274	322	463
Philippine Republic	398	287	734	393	977
Saudi Arabia	130	103	329	325	145
Syria	5	20	107	447	82
Taiwan	11	11	12	136	164
Thailand	147	92	403	238	275
Other	137	549	518	209	277
Africa	1,977	1,260	3,556	4,106	2,141
Algeria	458	49	57	120	61
Belgian Congo	101	188	445	714	635
Egypt	340	245	1,671	1,800	160
French Morocco	74	77	43	61	152
Liberia	23	25	50	53	69
Mozambique	163	320	449	227	69
Union of South Africa	738	284	614	769	699
Other	81	72	227	362	296
Countries to which less than $1,000 were shipped in any year from 1951 to 1953 incl.[3]	—	—	41	61	325[3]
Grand Total	28,289	33,252	64,821	60,629	50,584

[1]In thousands of dollars; totals, being computed from unrounded data, may not agree exactly in last significant place.
[2]Preliminary figures.
[3]Figure for 1953 shows total where shipments were less than $1,000 in any one month.
Source: U. S. Bureau of the Census.
Compiled by:
Harold H. Shepard, Pesticides Staff — CSS-MAD, U. S. Dept. of Agriculture

By exporting money, this problem is partially met and at the same time, desired working relationships are developed with businessmen in other countries. This phase of the export business has just had a great deal of attention from top government leaders. The findings, as reported to business, touched off great scurrying to Washington to get more of the

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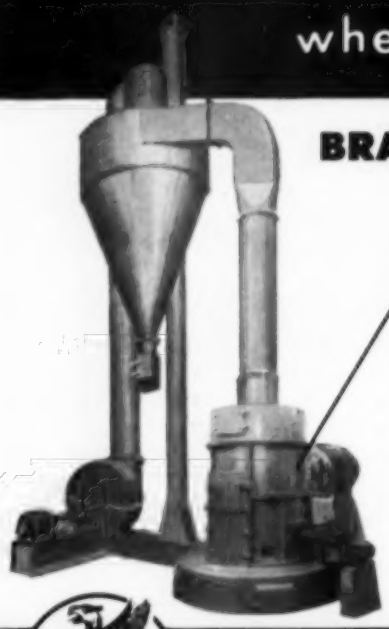

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Value of Exports of Some Pesticidal Chemicals, by Calendar Years, 1949-53.[1]

Agricultural Chemical	Schedule B Number	1949	1950	1951	1952	1953[5]
Benzene hexachloride[2]	820583	—	—	—	9,486	2,757
Calcium arsenate	820300	323	313	524	458	272
Copper sulfate	820100	4,321	4,151	8,754	8,483	6,253
DDT[3]	820580	4,661	5,050	14,752	15,731	10,508
Lead arsenate	820200	187	216	165	62	84
Nicotine sulfate	820010	1,326	311	408	489	320
Paradichlorobenzene	820560	235	193	498	281	212
Pyrethrum extracts	820530	106	154	207	168	298
(Sulfur, crushed refined)[6]	571500	(1,683)	(2,249)	(1,948)	(2,451)	(2,027)
Sulfur, formulations 20 percent or more[4]	820588	—	—	—	—	2,450
Sulfur, agricultural n.e.c.[4]	820589	—	—	—	—	764
Insecticides, agricultural n.e.c.	820590	12,277	18,250	34,143	15,359	14,809
Insecticides, household and industrial	820600	3,748	3,314	3,450	4,282	3,906
Disinfectants, household and industrial	820900	1,107	1,300	1,920	1,724	2,223
Weed killers[4]	820587	—	—	—	4,102	4,174
Total Value[6]		28,291	33,252	64,821	60,625	49,030

[1]In thousands of dollars.
[2]Preparations containing 1 percent gamma or more; not including mixtures with 20 percent or more of sulfur.
[3]Preparations containing 25 percent or more.
[4]Previously classified under "Insecticides, agricultural n.e.c."
[5]Preliminary.
[6]Crushed refined sulfur not included in total value of pesticide exports.

Source: U. S. Bureau of the Census.

Compiled by:
Harold H. Shepard
Pesticides Staff
CSS-MAD
U. S. Dept. of Agriculture

facts. At this writing, it is still going on.

The Foreign Operations Administration recently surveyed its foreign missions asking for their people to submit a list of the six fields of industry which appear to have the most pressing need for expansion. Replies poured in from U. S. overseas employees in scores of countries. The information was listed in table form and made available to those in the businesses listed. The data includes country, industry believed most needed, and some explanatory data.

New fertilizer plants and other facilities are believed needed most in these countries: Burma, Colombia, Dominican Republic, Egypt, El Salvador, Honduras, Indonesia, Iran, Peru, Saudi Arabia, Thailand, and Turkey.

The list of countries where pesticide plants are believed needed is not nearly as inclusive as the fertilizer list. Reasons for this are not entirely clear since the need for pesticides is generally considered as pressing as fertilizer. Ease of export and shipment of pesticides may be one of the reasons. The FOA list includes: Ar-

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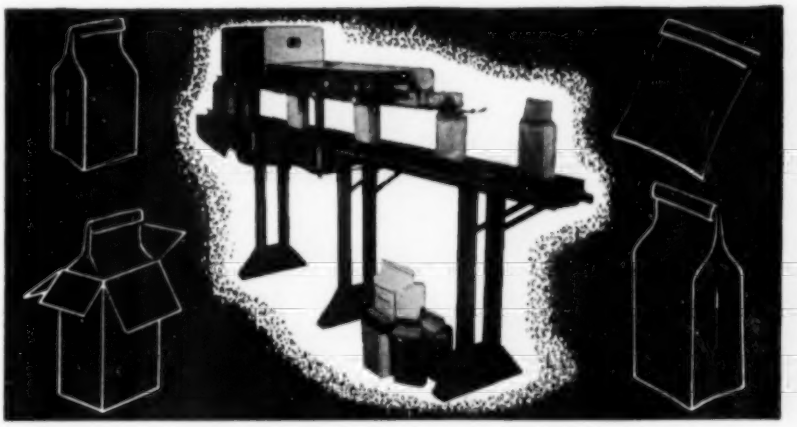

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Here's a proved safeguard against highly-toxic insecticides in heavy concentrations usually found in airplane spraying, indoor operations and mixing. Safety-engineered facepiece provides full vision, complete facial protection, and a comfortable, gas-tight seal. Canisters replaced in seconds. Types for every use. Accepted by the U.S. Interdepartmental Committee on Pest Control.

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gentina, Dominican Republic, El Salvador, and Turkey.

These lists are based on the opinions of government men in or near the countries listed. As such they have on-the-scenes value. However, any decision to invest money can usually only be made by those who have it. There are many additional bits of information in possession of government men which do not appear in print. They can be had only by personal contact. This information is available to all—who come to Washington and ask questions. Top men in both large and small business have been getting the reports first hand.

For a number of reasons, Turkey appears to be up for early study by a number of companies. For one thing, there is a new investment law which was written in consultation with key U. S. business men. Also, there is the feeling that American business is really wanted by the Turks and that efforts will be made to offer satisfactory facilities to attract capital.

No market studies have been made by the government however. This is one of the first questions asked. One or two studies wouldn't satisfy all those interested, and there would be charges of favoritism. But you can "pick the brains" of Government men and perhaps come up with the encouragement you are seeking.

We hear a great deal about the competition between the free world and Communism over the minds of men. There is also competition for the markets of men. This is a main reason why the Administration is anxious to give real help to business to increase the exports of American goods and capital. There are signs it will succeed. ★★

ENTOMOLOGY 100 YEARS

(*Continued from Page 65*)

thrum culture in California stimulated use of this material; 1880 carbon bisulfide recommended for control of cabbage maggot; 1880 use of lime-sulfur for San Jose scale control; 1885 discovery of poison bait for grasshopper control using arsenic and bran middlings; 1886 use of HCN recommended for control of citrus problems by fumigation; 1892 lead arsenate first used on gypsy moth, replacing paris green. Lead and calcium arsenate remained standard materials till 1946; 1892 first form of dinitro used; 1894 first case of honey-bee poisoning by lead arsenate sprays on plant foliage (bee keepers have been in the entomologist's hair ever since); 1896 first use of crude petroleum; 1897 oil of citronella used as mosquito repellent; 1896 first economic poison legislation; 1893 English hop-poisoning case—6,000 affected from drinking poisoned beer; 1907 case of calcium arsenate chlorosis; 1909 first nicotine sulfate produced in Colorado; 1910 first Federal Insecticide Act; 1911 derris patented by British; 1912 calcium arsenate production stimulated by war; 1912 Volk developed basic lead; 1916 chemistry of lead worked out; 1917 development of dry carriers for nicotine; 1917 liquid HCN commonly used; 1921 first commercial use of planes for control of catalpa sphinx in Ohio; 1921 first cube' tested; 1925 introduction of selenium and sodium selenate — first systemics in United States; 1927 first arsenic tolerances; 1927 fumigation value of EDB known; 1928 Peet-Grady standards for fly sprays formulated and first standard screening technique worked out; 1929 Thiocynates produced; this was first production of synthetics in this country; 1929 development of grade standards for petroleum products; 1932 use of methyl bromide in France; 1936 dinitro-o-cyclohexylphenol first residual for acaracidal purposes; 1939 insecticidal activity of DDT discovered by Mueller in Switzerland; 1940 sesame oil used as insecticide activator; 1941 BHC discovered in France; 1942 British did their first work on BHC; 1942 DDT first came to this country; 1943 first DDT manufactured here; 1942 value of DD as a soil fumigant discovered; 1945 development of chlorinated materials, chlordane, toxaphene, etc.; 1946 dieldrin, aldrin; 1947 Federal Insecticide Act; 1948 isolation of cinerin I; 1949 systemics—OMPA, systox, newer acaracides; 1950 endrin, isodrin, perthane.

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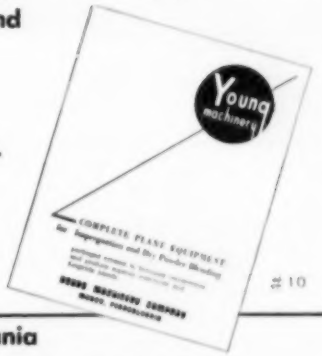

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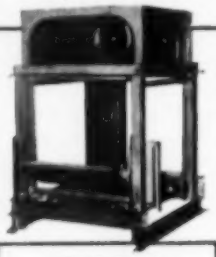

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people to keep abreast of developments. Better use could be made of our present materials if more were known of their action. Additional knowledge of the mechanism of insecticide resistance could also be used to advantage in control programs. There will be no let-up in the production of new materials, because of constant demand by the public for high crop production of better quality goods.

The number of products "screened" during the Jet 40's has been in excess of 200,000. If we were able to tailor the chemical molecule to suit our requirements, as is done in certain other sciences, better and more useful compounds could then be made available.

Biological balance is still important. A few years ago, there was an infestation of cottony cushion scale involving some 37,000 acres in Tulare county, Calif., following the application of DDT. It looked very much as if they were on the way out; then the Vedalia ladybird beetles were brought in and saved the day.

Increased development of chemical control measures has aided in development of interest in entomology, and as a result of the many problems which have been encountered, present interest in the field is greater than it has ever been.

At the present time, an entomoligist needs to be a chemist as well as an entomologist. In looking toward the future, there is no doubt as to where we'll go, but before we reach that goal, we will have to face the complications of legislation, tolerances, etc. This in turn will increase the scope of the science.

Organoleptic tests are most interesting. They have already shown that the same crop grown in different localities using certain fertilizer materials many contain different amounts of solids. When plant nutrition is stepped up, it brings in other side-chain reactions, and informative work along other lines is needed.

The early trend of the "Jet 40's" is slowing down a little, at the present time greatest interest is in the field of systemics, and these introduce many new problems—those of plant nutrition, physiology, zones of plant feeding by insects, etc. The future of this field will be of great interest.

I predict the present decade will be designated as the "Blazing 50's", and that by the end of the century refuges will have to be set up to show future students what a normal population level of insects should be.★★

MOLYBDENUM

(*Continued from Page 45*)

the Hawaiian and Fiji Islands; and in India.

All told, it seems probable that in the world as a whole several hundred million acres could profitably be treated with molybdenum. In the United States alone several tens of millions of acres might well be treated economically. Molybdenum thus promises to become a powerful tool to expand world markets for fertilizers and other farm chemicals.★★

'54 IN REVIEW

(*Continued from Page 31*)

scrupulous elements from giving the entire industry a black eye.

Agricultural chemicals is a field that is bound to grow, and its growth must be kept headed in the right direction. Each year, there are new challenges. The unprecedented outbreaks of armyworm have introduced this pest to farmers from coast to coast. From California comes news that the Khapra beetle — heretofore a problem in Europe and Asia has been found in stored grain. All over the country, grain fumigation has been given a big boost because the Government, in buying and storing grain in its warehouses, has emphasized the need for getting rid of insect residues and contamination. There's a new rust on oats that requires action. War has been declared on weeds, and even flowers that choke irrigation canals. And even if there weren't these and other new horizons for pesticides, the present market is expanding as more and more proof of higher and better crop yields is reported by pesticide users.

Yes, I am bullish about this business. I am convinced the years ahead will see a healthy, steady, growth of this industry.★★

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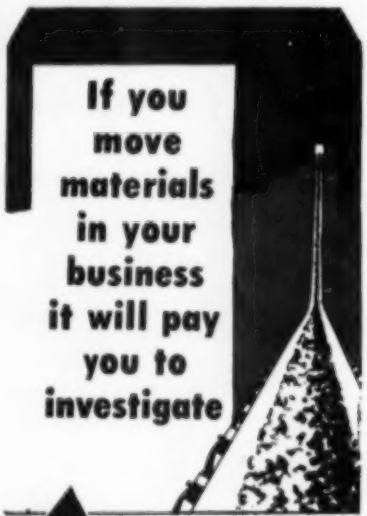

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NITROGEN CAPACITY

(*Continued from Page 56*)

twice the current rate of consumption. Thus it is indicated that in spite of recent tremendous increases in the ability of the agricultural chemical industry to produce nitrogen, no oversupply should result if it is used by the American farmer at rates that are currently recommended as economically sound.

Tables accompanying this article, reproduced from the Baker report, show Production of Nitrogen Compounds in the U. S., Consumption of Nitrogen Materials by Direct Application in the U. S., Estimated 1953/54 Consumption of Nitrogen in the U. S. and Possessions for Fertilizer Purposes, and a list of U. S. Nitrogen Plants in Operation, Under Construction, or Proposed, with Location and Rated Capacity. Additional tables are included in the report which, because of space limitations, are not included here. They list Producers of Fertilizer Grade Ammonium Nitrate, Producers of Synthetic Ammonium Sulphate, Anhydrous Ammonia Plants in Operation and Anhydrous Ammonia Plants Under Construction.★★

	Rated Capacity Tons NH_3 per Year				
	Present	Under Const.	Proposed	Total	Total Ton N. Pr. Yr.
Col-So. Chemical Natrium, W. Va.		33,000			27,000
Atlantic Refining Co. Point Breeze, Pa.		33,000		33,000	27,000
Northern Chemical Ind. Searsport, Me.		42,000		52,400	43,000
Sandy Point, Maine					——
Westvaco Chemical Charleston, S. C.					——
CANADIAN					
Consolidated Mining Calgary, Alberta					60,000
Warfield, B. C.					60,000
Dow Chemical Co. Sarnia, Ont.					5,000
No. Amer. Cyanamid Welland, Ont.					37,000
Canadian Ind. Windsor, Ont.					3,000

Source: "Agriculture & Food Chemicals"—June 1954
U. S. Dept. of Agriculture, Con. Stab. Service, Fertilizer Div., June 1954.
Prepared by: H. J. Baker & Bro.

Nitrogen: Estimated 1953/54 Consumption For Fertilizer Purposes — U. S. & Possessions

In tons of 2,000 lbs. nitrogen (N)

	Am. N. All Grades	Am. Sul. & A.S.N. 1/	Other Solids 2/	Natural Organics 3/	Compound Ammoniating Sol AN-NH_3 & UAL 4/	NH_3 for Ammoniation 5/	Ammonia for direct application 6/	Total by Source
U. S. Prod.								
Syn ammonia	285,000	115,000	100,000	—	405,000	70,000	325,000	1,300,000
By-product am.	—	177,000	—	—	—	3,000	—	180,000
Natural Organ.	—	—	—	35,000	—	—	—	35,000
Total	285,000	292,000	100,000	35,000	405,000	73,000	325,000	1,515,000
Exports	1,000	7,000	11,000	1,000	20,000	—	—	40,000
Net Domestic Pro.	284,000	285,000	89,000	34,000	385,000	73,000	325,000	1,475,000
Imports	180,000	90,000	166,000	5,000	—	—	—	441,000
Total Supply— U. S. & Possessions	464,000	375,000	255,000	39,000	385,000	73,000	325,000	1,916,000
Percent (increase or decrease) of November, 1953 estimate								—4.5
Percent (increase or decrease) of 1952-53 supply								6.2

For the purpose of this tabulation, the following groupings have been made:
1/ Includes estimated ammonium sulfate content of imported and exported mixed fertilizers.
2/ Includes estimated ammonium phosphates, sodium nitrate, urea mixtures, calcium nitrate, cyanamid and nitraphosphates.
3/ Estimated nitrogen content of natural organics used in commercial fertilizer.
4/ Includes estimated nitrogen content derived from solutions and ammonia in exported ammoniated superphosphates and mixed fertilizers.
5/ Includes compound nitrogen solutions, ammonium nitrate solutions, ammonia liquor and aqua ammonia used for ammoniation.
6/ Includes nitrogen solutions and a small quantity of aqua ammonia for direct application.

Source: U. S. Department of Agriculture
Commodity Stabilization Service
June 1954

Prepared by: H. J. Baker & Bro.

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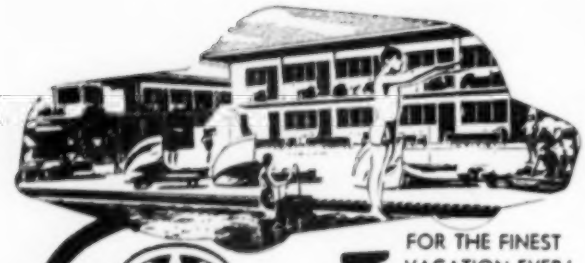

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Tale Ends

Every common variety of Iowa seed, feed and fertilizer was recently deposited in a concrete vault, which is marked by a 20-foot reinforced concrete spire. This hoarding of grain and feed is not due to any pending shortage of food, but in line with activities of the Iowa State Fair. Clyde Spry, Iowa secretary of agriculture, said that agricultural materials will probably change greatly in the next hundred years, and the collection will be of considerable interest when the concrete vault is opened at the bicentennial Iowa State Fair in the year 2054.

AC

A nutrition exhibit, "Food for Life," sponsored by Swift & Co., at the Museum of Science and Industry in Chicago, shows a cross section

of soil, illustrating how soil can be rebuilt, the use of plant food, contour plowing, strip cropping, crop rotation, etc. The exhibit has actual plants growing in a farm plot, under artificial light in artificially drained and nourished soil.

AC

Another addition to the line of agricultural groups acquiring TV-fame is the National Fertilizer Association. Staff members presented a general picture of NFA's organization and services on the television show "Round the Town," which is beamed to Washington area viewers. James E. Totman, president of Summers Fertilizer Co. and former chairman of the Board of Directors of the NFA, was interviewed in the absence of Dr. Coleman.

AC

Following recent publicity on radio, tv and in various magazine articles, agricultural insect control can now claim screen fame also. Local New York theatres during the newsreel briefs, have been showing a two-minute film on aerial spraying of DDT in New Brunswick in control of the blight worm.

AC

A new service to the farmer which may contribute considerably to "trace element" interest and sales is offered by National Spectrographic Laboratories, Cleveland, Ohio. This firm now analyzes leaves from fruit trees or vines and reports back to the farmer whether the trees or vines are deficient in any minerals.

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As of September 1, 1954, the insecticide business of U. S. Industrial Chemicals Co. Division of National Distillers Products Corp., has been purchased by Food Machinery and Chemical Corporation. Included in this transfer of operations are U.S.I. laboratories and manufacturing facilities in the Fairfield industrial section of Baltimore, Md.

Effective the same date, Food Machinery established the Fairfield Chemical Division as a completely separate division to manufacture and sell insecticide materials and other diversified chemicals.

Operations of the Fairfield Chemical Division of Food Machinery and Chemical Corporation will continue to be handled by the experienced people who have been identified with the operations of the insecticide division of U.S.I. No changes in policy or basic procedure are contemplated now or in the future. The Fairfield Chemical Division will continue to serve customers of Pyrenone, and related products, as they have been served in the past by U.S.I.

Headquarters sales offices of Fairfield Chemical Division will be in the Graybar Building, 420 Lexington Ave., New York 17, N. Y. Branch offices will be located in Chicago, Kansas City, San Francisco, New Orleans, and other strategic points.

Both Food Machinery and National Distillers are cooperating to make certain that the transition of ownership of insecticide operations causes a minimum of inconvenience to customers.

Reg. U.S. Pat. Off., F.M.C.

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